

2008 Oklahoma State University Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted
Date Accepted: 06/03/09

2008 Oklahoma State University Combined Research and Extension Annual Report of Accomplishments and Results

I. Report Overview

1. Executive Summary

The Division of Agricultural Sciences and Natural Resources (DASNR) at Oklahoma State University has an integrated approach to research and extension programs. Over the past several years the Oklahoma Agricultural Experiment Station (OAES) and the Oklahoma Cooperative Extension Service (OCES) have developed multi-disciplinary TEAMS of research and extension faculty based on priority research and extension needs. The TEAMS are based on priorities identified by stakeholders and research and extension faculty and specialists. Our Planned Program areas as identified in our Plan of Work serve as overarching guides for the priority areas. Each of the TEAM activities is thus covered under one of the Planned Program areas. Each of the research and extension faculty members and/or specialists remains administratively connected to a disciplinary department or geographic unit. However, each also plans and conducts research and/or extension program efforts in close collaboration with other individuals within at least one multi-disciplinary TEAM.

Significant research and/or extension efforts and developments during 2008 included the following.

Crop Enterprises. FHS (first hollow stem) method was developed originally by Oklahoma State University research and extension scientists. This method reduces mistiming of grazing termination in wheat pasture. To help prevent these losses, we monitor first hollow stem, conduct in-service trainings, and hold grower workshops on methodology and benefits of scouting for first hollow stem. Surveys of producers indicate that between 35% and 45% of dual-purpose wheat producers in Oklahoma check their individual fields and use first hollow stem as a criterion for removal of cattle from wheat pasture. In addition, Oklahoma Cooperative Extension specialists monitor first hollow stem at two locations (Stillwater and El Reno, OK) and data are distributed to extension educators and stakeholders via electronic newsletter during the growing season. Based on newsletter response and county educator input, it is estimated that at least 80% of dual-purpose wheat producers follow these numbers and use them for removal of cattle from their wheat pasture. Thus, this management practice developed by OAES and delivered to producers over the last ten years by OCES personnel resulted in increased income from wheat grain in Oklahoma of between \$125,000,000 and \$230,000,000 for 2008.

In the winter-wheat market, farmer profitability is yield-driven while end-user value is quality driven. While yield potential and end-use quality are not mutually exclusive traits, developing and marketing cultivars that satisfy both requirements is extremely difficult. The fact that there are relatively few scientists and even fewer private companies working in the area of wheat improvement exacerbates the problem. The Oklahoma State University Wheat Improvement Team (made up of OAES and OCES scientists) was developed as a cross-cutting collection of scientists who work collaboratively to develop, test, and distribute improved wheat cultivars for the Southern Great Plains. Acreage of the disease-susceptible varieties Jagger and Jagalene dropped from 58% to 48% of planted acreage. In contrast, acreage of the improved varieties (developed and tested at OSU) Endurance, Overlay, and OK Bullet increased from 7% (2004) to 24% (2008) of planted acres. These changes resulted in improved quality and reduced grain losses. In addition to improved end-user quality, these three improved varieties developed by OAES and tested and extended by OCES averaged three bushels per acre more in 2008 than the traditional varieties. Thus the 17% increase on 5.6 million acres of wheat at average 2008 prices resulted in over \$18.5 million of added income for Oklahoma producers.

Plant Biological Technologies. Results of research indicated that diptera species common in pastures and range land and in close proximity to vegetable production crop land, may transfer disease causing bacteria from livestock waste to vegetables. This work has resulted in vegetable producers changing production practices to require greater distance between animal production areas and vegetable crops.

Commercial and Consumer Horticulture. Research conducted by OAES scientists during the past year focused on the use of cottonseed and canola meal as organic fertilizers for landscape plantings. One Oklahoma cottonseed mill estimated that they produced more than 50,000 metric tons of cottonseed or canola meal during a typical year while extracting oil for cooking purposes. With costs of petroleum fuels increasing, cottonseed and canola are being investigated as potential biofuel sources. The amount of meal produced as a byproduct will increase as biofuels become more accepted, making meal disposal more challenging. Our research showed that no difference in plant growth of marigolds or redbud trees fertilized with cottonseed meal, canola meal, or commercial fertilizer occurred. Results suggest that cottonseed meal and canola meal can provide necessary plant nutrients over time as the materials degrade in the soil. This is an advantage over standard commercial fertilizers

in which the nutrients are rapidly released and often leach from the root zone with heavy rains or irrigation resulting in environmental concerns as well as loss of money for growers. Retail price of cottonseed and canola meal ranges from about \$1.74/kg to \$3.83/kg. At this price, the sale of 50,000 metric tons as organic fertilizer could result in potential income of \$87 to \$191 million for extraction mills.

Ecosystem and Environmental Quality and Management. Red cedar and other invasive species tend to dramatically reduce forage production, wildlife habitat, and water availability while at the same time increasing wildfire danger. The results are a significant economic and risk burden for agricultural producers, rural and suburban communities, recreational users and others. OCES specialists have helped organize six Prescribed Burn Associations to help landowners gain experience and equipment for conducting prescribed burns. Training and information are provided by OCES specialists and educators and weather-fire models are provided through the OAES/OCES Oklahoma Mesonet. Training and education concerning prescribed burning is also provided to landowners and fire departments outside of the associations. Last year just the six Prescribed Burn Associations alone conducted 78 fires on over 50,000 acres. This does not include thousands of other acres using OSU prescribed burn techniques during 2008. Analysis of range rental for grazing, rental rates for recreation, and NRCS information indicate that Prescribed Burning of rangeland can increase income per acre between \$10 and \$35 beyond the cost of burning depending on the location and use of land. Thus if we use an average return of \$22.50 per acre, the return to just the 50,000 acres in the associations is estimated to be \$1,125,000 during 2008.

Animal Enterprises. The meat goat industry has been rapidly expanding in Oklahoma and the United States. Meat goat numbers in Oklahoma have gone from not even being counted by USDA to 94,000 in 2007, ranking 5th in the U.S goat numbers. This rapid expansion in goat numbers has created a need for meat goat production education. Many goat producers are relatively new to livestock production and not only need education on goat production practices but also education on how to do the simple livestock management techniques. The Oklahoma Meat Goat Boot Camp was created to provide a multi-day workshop where producers could learn management and production practices that would help them own/operate a successful meat goat operation. Five workshops on goat production and marketing were held during 2008. Presentations on goat production were made at various industry conferences with a total audience of over 1,200. Evaluation and impact analysis on just two Boot Camp workshops attended by 111 participants from fifteen states showed the following results. 1) 80% of the sessions taught were of great value to participants; 2) 45% potential adoption rate of information and management practices from the boot camp; 3) Average perceived dollar value of the information presented was \$20.89/goat; and 4) Total value perceived by participants for both camps was \$93,600.

Food Processing, Product Storage and Food and Product Safety. The eggs of paddlefish harvested in Oklahoma have typically been a wasted product that was used for bait or discarded. This represented a substantial loss of potential revenue as paddlefish eggs are considered high-quality caviar and have substantial market value when properly processed and sold. Capturing this revenue stream allows for (1) Improving the management of Oklahoma's paddlefish population; (2) Expanding existing paddlefish research programs; (3) Improving the experience of the paddlefish angler; (4) Promoting food safety; and, (5) Creating a self-funded program. The funds generated by the program are used for research and management of paddlefish and law enforcement. Income for the first year of operation of the paddlefish processing facility was over \$1 million. The new fixed-facility will increase income far beyond this level in the future. A great deal of research information has been collected on the species and ODW believes that the welfare of the paddlefish has improved as a result. The funds generated by the program are used for research and management of paddlefish and law enforcement. Income for the first year of operation of the paddlefish processing facility was over \$1 million. The new fixed-facility will increase income far beyond this level in the future. A great deal of research information has been collected on the species and ODW believes that the welfare of the paddlefish has improved as a result.

Family Resiliency and Economic Well-being and Human Nutrition and Health. OCES initiated a "Farm to You" program during 2008. This program targets nutrition education for 3rd and 4th grade youth and uses a hands on exhibit transported in a specially equipment van. It is modeled after similar programs in other states including the program in Louisiana. OCES personnel and volunteers are visiting one to two schools per week with the exhibit and reaching about 200 to 400 youth per week. Oklahoma also became an active partner with Texas and New Mexico in the "Kids, Kows and More" program sponsored by the Southwest Dairy Producers' Association. This program focuses on 3rd and 4th grade youth and emphasizes the source and production of food and fiber. Over 2,000 students attended the program in 2008 and it should double in size in 2009.

Turfgrass Development and Management. In addition to providing enjoyment for thousands of Oklahomans, Oklahoma Golf courses provide \$132 million in economic output impacts each year, providing an additional \$81 million in value added impact, and providing 3,100 jobs and \$49 million in payroll. The turfgrass industry remains under intensive scrutiny to reduce labor, pesticide, fertilizer and other cultural inputs while providing cost effective product production, or in the case of maintained turf, soil erosion control with high visual or functional quality. A five year long project testing a rapid in-field sod commercial quality scoring system was completed. The technique allows for a single evaluator to rapidly screen sod pad handling characteristics.

This technique is valuable in turfgrass breeding/development programs as well as for sod farmers performing on-farm cultivar evaluations. Sod handling quality has a major influence on the sod production industry's receptivity of new varietal offerings.

OAES research results from cultivar evaluation trials are used directly by the OCES turfgrass specialists when making recommendations concerning turfgrass selection for a given site. During new construction and renovation of speciality turf areas such as golf courses and athletic fields, better-adapted turfgrass varieties are being utilized in over 85% of cases in Oklahoma. Fungicide use for dollarspot disease control has been reduced by at least 10% (2 applications) when L-93, A-1, A-4 and G-2 creeping bentgrasses have been implemented on golf course putting greens in Oklahoma. This has resulted in an estimated savings of \$75,000 per year total on all Oklahoma Golf Courses. Patriot hybrid bermudagrass and Riviera seeded bermudagrass, both improved OAES releases, continued to be installed on high school, college and professional NFL practice facilities and stadiums in the U.S. during 2008. For golf courses that treat with fungicides for spring dead spot disease, a 30 acre fairway facility would save a minimum of \$4,000 in fungicide use per year per facility by using an improved OSU bermudagrass variety as compared to an older susceptible variety acquiring the disease and requiring treatment. Sod producers utilizing a licensed OSU improved bermudagrass variety could expect to experience an additional minimum of \$13,500 in profits per year (after all additional costs are accounted for over and above public domain bermudagrass production) in a scenario of 30 acres of proprietary variety production/sales per year.

Community Resource and Economic Development. Of the over 5,000 manufacturers in Oklahoma, approximately half are located in rural areas and are extremely important to their local economies. To address the difficulties faced by our small rural manufacturers, the College of Engineering and the OCES work in partnership to provide technical assistance through the Applications Engineering program to provide on-site engineering assistance. In order to receive engineering assistance the client must agree to a post-project impact assessment. This impact assessment is done using procedures developed by the National Institute for Standards and Technology for the Manufacturing Extension Partnership. One measurement of impact is the economic value of the service to the company as reported by the client. Another measure is the number of jobs created or retained. Both impacts are measured by an independent survey of the client. In 2008, the Applications Engineers client projects had the following impacts: sales increase of \$21,882,099; sales retained (otherwise been lost) \$7,857,392; costs saved and avoided \$10,850,321; 185 new jobs created at \$75,511 per job; and \$16,701,732 investment in new plant facilities and equipment.

Integrated Pest Management Canola is a potentially valuable crop for Oklahoma wheat growers because it can help them manage difficult grassy weeds such as Italian ryegrass, and cheat and it provides an additional cash crop. Several insect pests (aphids and caterpillars) attack winter canola throughout the winter and spring months causing economic damage. In a survey conducted in 2006, canola producers listed insects as the second most important production problem that they faced, and aphids (cabbage, turnip and green peach aphids) were the most important insect pest problem. Producers are unfamiliar with their management, and made multiple insecticide applications for their control, with limited success. Entomologists conducted research demonstrations in 2007 and showed that that aphid sprays could be reduced from four applications per season to one per season by planting seed treated with imidacloprid insecticide and using treatment thresholds of 200 aphids per plant. Results of the research demonstrations showed that producers could save an average of \$30 per acre in spray costs with no loss in yield, resulting in \$150,000 in potential cost savings from reduced pesticide applications to the 2008 crop.

Farm and Agribusiness Management. Frequent changes in Federal and Oklahoma State Tax Laws create a need to keep tax preparers informed of the impact of the changes and how to best help their clients utilize the tax planning and management opportunities available in the current tax laws. OCES Farm and Business Tax Institutes and the summer Tax Clinic are designed to update tax preparers about new laws and regulations covering farm, non-farm business and individual taxpayer issues. The combination of all the schools allows a preparer to get the full 40 hours of CPE/CLE as required by state. Total 2008 attendance for the schools was approximately 2,106 tax preparers in 14 workshops. Certified public accountants make up 46 percent of the attendance, 27 percent are tax preparers and bookkeepers, 10 percent are enrolled agents, 2 percent are attorneys, and the remaining 15 percent come from a variety of backgrounds. These tax preparers file roughly 80 percent of the farm returns for taxpayers in the state of Oklahoma. Participants filed more than 51,000 Federal farm tax returns and 324,000 Federal non-farm tax returns as reported by the participants in the most recent program evaluations. Just two pieces of information supplied this year for farm returns and mineral owners is estimated to save at least \$10 per return on average - resulting a likely taxpayer savings of over \$3,000,000.

Sensor-based Technologies for Agricultural and Biological Systems. Since 1950, cropping systems in Oklahoma have tended to be monoculture systems. The lack of crop diversity has led to an increase of fertilizer and pesticide use. Until recently producers have had little incentive to not over fertilize, especially with nitrogen. OAES scientists developed the GreenSeeker sensor-based technology. Demonstration trials conducted in since 2005 indicated an average of \$14/acre benefit from sensor based nitrogen management over corn sites in NE Oklahoma. Similarly, wheat trials in NW Oklahoma showed a \$10/acre benefit using the flat N rates determined using the GreenSeeker sensor combined with the on-line Sensor Based Nitrogen Rate Calculator. Extension programs have been developed to diversify cropping systems and actively manage N fertilizer during the growing season. In the past, N fertilizer recommendations have not been very accurate at predicting N fertilizer needs. In 2008,

at least 20 counties across the state reported producers using sensors and reference strips with an estimated coverage of 70,000 plus acres, that OSU extension had a part in or was responsible for. This estimate did not include the acres that were being supported by private individuals or industry, under which there are approximately 30,000 known acres and many unreported acres. In addition, there were 68 EQIP contracts (more than 40,000 acres), filled across the state for the use of the GreenSeeker(tm) Sensor and N-Rich strip as a Better Management Practice (BMP). Assuming nitrogen cost 75 cents per pound and an average savings of 30 pounds of N per acre (2006 reference strip survey), farmers saved an average of \$22.50 / acre or over \$3,150,000.

Total Actual Amount of professional FTEs/SYs for this State

Year:2008	Extension		Research	
	1862	1890	1862	1890
Plan	162.0	0.0	60.0	0.0
Actual	268.0	0.0	93.0	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- Combined External and Internal University Panel
- Expert Peer Review
- Other (Administrative Review)

2. Brief Explanation

All Experiment Station projects, whether supported by Hatch or McIntire □ Stennis funds, are peer reviewed prior to submission. This includes the Special Grants. It should be noted that stakeholder input into the planning process, position priorities, and research areas to be pursued by the scientists could be considered as the initial step in the review process. This valuable input helps in the merit and relevancy of our projects; it is a continual practice during the decision process to fill new positions, and direct research efforts and approaches to high priority needs.

Each department in OAES is required to have three reviews for a project (selected by the appropriate Department Head), with one of those reviews being external to the department. In those cases, this will be from another department in the Division, from another College at OSU, or another state with expertise in the area. These reviews are approved at both the departmental and OAES Directorate levels before submission to CSREES. The principal investigator is required to respond to the comments provided by the reviewers before final approval is granted.

All OAES/OCES teams are required to have a team plan of work which is reviewed by team members, the administrative leaders, and the appropriate OAES/OCES assistant and associate directors. All team plans of work are reviewed with respect to relevance, the Division Strategic Plan, stakeholder input, and team competitive advantage. All individual OCES plans of work (5 □ year and annual) developed by county, area, district and state program professionals are reviewed in reference to quality and relevance by at least two individuals with program and/or administrative responsibility pertinent to the individual's program area. The reviewers assess the merit of the program plans of work with respect to issues, needs, and problems identified through stakeholder input, quantity of effort planned in relation to appointment, and plans to evaluate and report program quality and impact. County plans are reviewed by the appropriate district subject matter specialist, district director, and state program leader (when appropriate). Area and district specialist plans are reviewed by the district director, the subject matter department head, and appropriate assistant director/state program leader. State specialist plans are reviewed by the appropriate department head and the appropriate assistant director/state program leader.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (Professional journals, meetings, etc.)

Brief Explanation

A broad array of actions were used to encourage stakeholder input. Personal invitation and public notice are regularly used in Extension Program Advisory Committees as well as when we seek input to experiment station projects. Most all state-wide and unit advisory groups are notified through direct contact. Several programs have targeted non-traditional stakeholder participation including sustainable agriculture, agri-biosecurity, water, wildlife, youth, etc. Several surveys of existing and potential interest groups were conducted during the year as part of graduate student programs and the Oklahoma Agricultural Statistics group has worked with us on several farm related surveys. Farm commodity groups regularly are invited to campus and we attend most of their meetings in order to hear input. A few of our advisory groups are statutory in nature.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief Explanation

Every county holds 2-4 public program advisory meetings annually.

OCES and OAES also meet with numerous boards, commissions, associations, public agencies, departmental advisory committees, special needs groups, individuals, businesses, etc each year.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Other (Peer reviews, grant proposal reviews)

Brief Explanation

Following are some examples of stakeholder input- this list is in no way exhaustive. Representatives from OAES and/or OCES met with the following stakeholder groups:

Division of Agricultural Sciences and Natural Resources Advisory Council
October 21, 2008 - Stillwater
March 25, 2008 - Stillwater

Oklahoma Wheat Commission
February 14-15, 2008 – Stillwater
April 23, 2008 – OKC
May 21, 2008 – Kingfisher
July 23, 2008 – OKC
August 5, 2008 – Stillwater
August 14, 2008 – Stillwater

Oklahoma Peanut Commission
February 14-15, 2008 – Stillwater
April 18, 2008 – OKC

Oklahoma Sorghum Commission
April 21, 2008 – OKC
October 29, 2008 – Stillwater

Oklahoma Wheat Growers Association Board
February 13, 2008 – Stillwater
August 5, 2008 – Stillwater

Oklahoma Crop Improvement Association Board
February 8, 2008 – OKC
August 28, 2008 – Stillwater
December 4, 2008 – OKC

Oklahoma Agricultural Retailers Association Board
January 25, 2008 – Enid, OK

Soil Fertility Research and Education Advisory Board
May 19, 2008 – Stillwater
October 10, 2008 – Stillwater
December 17, 2008 – Stillwater

Canola Advisory Board
March 5, 2008 – Stillwater
April 9, 2008 – Perkins

Oklahoma Grain and Feed Association
May 7, 2008 – OKC

Oklahoma Seed Trade Association
May 14 – OKC

Oklahoma Genetics Inc. Board
February 8, 2008 – OKC
Oklahoma Home and Community Education

Oklahoma Ag in the Classroom Advisory Committee
Quarterly

4-H Centennial Committee
February 7, 2008
May 23, 2008
November 17, 2008

4-H Shooting Sports Committee
July 2, 2008

Land Judging Committee
February 2008

Health Rocks Advisory Team
March 17, 2008
April 21, 2008

4-H Centennial Gardens Committee
October 25, 2008
November 22, 2008

Ok Youth Forestry and Wildlife Camp Committee
Monthly from January to June 2008

Northeast Oklahoma Beekeepers Association
March 21, 2008

USGA Advisory Committee
June 3, 2008

Oklahoma Pecan Growers Association
June 29, 2008

Rural Health Works Committee
Every other month in 2008

Rural Health Works National Advisory Committee
January 2008
Stormwater Advisory Committee
January 2008

Tribal On-Site Waste Project Advisory Committee
Several times in 2008

Oklahoma State Water Plan
42 county-based public input meetings organized by OCES
11 regional-based public meeting to review and discuss county input hosted by OCES

Integrated Environmental Research and Education Site Advisory Committee
September 2008 - Stillwater

Oklahoma Sustainable Agriculture Research and Extension Advisory Committee
September 16, 2008 – Oklahoma City

Oklahoma Food and Agricultural Advisory Center Advisory Committee
This statutory committee meets twice per year

3. A statement of how the input was considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities
- Other (In team planning and budget requests)

Brief Explanation

Some examples of responses to stakeholder input follow – these are by no means exhaustive.
 Hired a weed science extension specialist to address commodity production needs
 Increased the number of peanut performance nursery entries
 Revised weed seed standards for certified classes of wheat seed for Oklahoma
 Developed a website to report research findings on efficacy of various commercial fertilizer products
 Initiated research to develop and test foliar application of phosphorous fertilizer via variable rate technology
 Developed and implemented regional network of canola varietal yield test nurseries
 Attempted to increase awareness of issues involving consumer decisions
 Added ideas for Ag in the Classroom lessons
 Conducted 4-H Centennial events including t-shirt and video development
 Revised policies relating to shooting sports programs
 Developed new volunteer curricula
 Developed new 4-H centennial garden at the OSU Botanical Gardens
 Evaluated past camps and conducted 2008 Forestry and Wildlife Youth Camp
 Expanded list serve for alfalfa weevil forecasting to more growers, cooperators, and members of Ok Hay and Seed Association.
 Expanded the number of sites for monitoring and testing for Hessian fly
 Plans to increase monitoring of pecan nut casebearer for 2009
 Developed new strategies related to insect, disease, and cultural problems associated with turfgrass in golf courses
 Selected new research topics for Rural Health Works
 Develop a workplan for new Stormwater Specialist position
 Developed and implemented an environmental needs survey for 22 Native American tribes
 Public state water plan preliminary development
 Developed state plan for Sustainable Agriculture Education
 Began development of new Integrated Environmental Research and Education Site at the OSU Botanical Gardens

Brief Explanation of what you learned from your Stakeholders

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
4944045	0	3243772	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	5479209	0	3243770	0
Actual Matching	5479209	0	3243770	0
Actual All Other	28100178	0	26219938	0
Total Actual Expended	39058596	0	32707478	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous years				
Carryover	535164	0	0	0

V. Planned Program Table of Content

S. NO.	PROGRAM NAME
1	Animal Enterprises
2	Crop Enterprises
3	Plant Biological Technologies
4	Commercial and Consumer Horticulture
5	Ecosystem and Environmental Quality and Management
6	Food Processing, Product Storage, and Food and Product Safety
7	Family Resiliency and Economic Well-Being and Human Nutrition and Health
8	4-H Youth Development
9	Turfgrass Development and Management
10	Community Resource and Economic Development
11	Integrated Pest Management
12	Agricultural Biosecurity
13	Structure and Function of Macromolecules
14	Farm and Agribusiness Management
15	Sensor-Based Technologies for Agricultural and Biological Systems
16	Bio-Based Products Development

Program #1**V(A). Planned Program (Summary)****1. Name of the Planned Program**

Animal Enterprises

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources	15%		5%	
302	Nutrient Utilization in Animals	20%		20%	
303	Genetic Improvement of Animals	4%		20%	
304	Animal Genome	2%		10%	
305	Animal Physiological Processes	4%		10%	
306	Environmental Stress in Animals	6%		10%	
307	Animal Management Systems	25%		10%	
308	Improved Animal Products (Before Harvest)	9%		5%	
311	Animal Diseases	10%		5%	
315	Animal Welfare/Well-Being and Protection	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	22.0	0.0	9.0	0.0
Actual	29.0	0.0	3.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
525000	0	258125	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
525000	0	258125	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2910018	0	2086467	0

V(D). Planned Program (Activity)**1. Brief description of the Activity**

Develop research-based information such as peer reviewed journal articles, scientific reviews, and abstracts.

Develop decision aids and management programs developed that assist cattle and forage managers in improved, better informed decisions.

Conduct educational programs to improve the management skills, profitability and other success factors of people managing cattle and forages. Outputs for these activities would include fact sheets, books, and other extension publications, conference proceedings, web sites and conferences.

Identify BVDV infected beef breeding herds and develop a control program including biosecurity and enhanced vaccination programs.

Demonstrate the economic effects of BVDV and BRD to the stocker and feedlot operations.

Support for BVDV control at the breeding herd for increased economic return.

In animals exposed to BVDV, BRD, or both, we will identify biological links that exist between the bacteria and/or virus, reduced animal performance, and meat quality.

2. Brief description of the target audience

Managers, owners and employees of farms, ranches and agribusinesses, research scientists, extension personnel, beef cattle producers, and the general public.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	575	1800	100	200
2008	231520	672500	3500	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	31	16	47

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Conferences, symposiums, and meetings

Year	Target	Actual
2008	25	141

Output #2

Output Measure

- Peered reviewed journal articles

Year	Target	Actual
2008	14	16

Output #3

Output Measure

- Extension publications: fact sheets, proceedings, books, manuals, bulletins

Year	Target	Actual
2008	15	31

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Number of producers registered with a premise ID
2	Number of cattle identified in compliance with the National Animal Identification Plan
3	Total number of producers certified as Master Cattlemen
4	Number of producers implementing improved management, grazing systems and beef production systems resulting in improved sustainability.
5	Number of producers implementing management programs to decrease the incidence and economic impact of BVDV and BRD

Outcome #1**1. Outcome Measures**

Number of producers registered with a premise ID

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	3000	7103

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

One of the largest threats to the livestock industry is the natural or intentional disease outbreak that affects the marketing of livestock products. A National Animal Identification System (NAIS) had been proposed to help control a disease outbreak should it occur in the United States. The NAIS proposed a combination of identifying locations where animals are present (premise identification), unique animal identification, and a movement database to allow determination of diseased animal movements and potential animals infected within two days. This system would reduce the time to track diseased animals from eight days to two days, resulting in a direct economic impact on the livestock industry of 7.2 billion dollars. While the NAIS has undergone a change to not be federally mandatory, the use of these technologies greatly eases the compliance by 2009, voluntary participation is being promoted under Federal/State/Industry partnerships.

What has been done

In 2008, five external grants were submitted related to electronic animal technologies and NAIS related education. In a collaborative effort with the Oklahoma Youth Expo, the Tulsa State Fair, and the Oklahoma Department Agriculture Food and Forestry the team from Oklahoma State University has conducted the first project (currently in its third year) in the country to investigate the opportunity to use RFID technology within the shows management program at a major youth livestock show for entry nomination, entry verification, show management, and potential 48 hour animal trace back in the case of a disease outbreak. This year approximately 26,800 youth livestock projects were tagged. Once tagged with an EID tag, the animal information and youth exhibitor information was recorded and entered into a simple OSU developed software program that was linked to the shows program which allowed for simple data management, class organization and show results output. In addition to the tremendous increase in show data management efficiency there were several benefits that are worth noting: 1) Specific advances for 2008 include the involvement of the Tulsa State Fair, expanding species included from sheep and goats to include cattle and swine, and using data for both the Oklahoma Scrapie program and for immediate payment of lambs sold to a commercial buyer.

Electronic identification name tags were used at the three meeting series of the Early Spring Roundup in Ardmore, OK. Identification, movement and weight information was collected each week and movement information was collected every time participants left or came into the presentation room. This information was used in presentations to demonstrate use of these technologies for daily management activities and in a separate demonstration was used to simulate a disease outbreak from a single livestock market in the state and what the impact to Oklahoma would be if we have a viable, organized system of information recording and communication in contrast to current systems. This demonstration lead to nearly two thirds of the producers present picking up and filling out premise registration forms that were available after the meeting. Both the Willard Sparks Research Center and the North Range Beef Cattle Unit continue to use electronic animal technologies. As advancements occur, the new technologies are evaluated for practical usefulness at the research stations.

Results

In 2008 external grants were secured for related research totaling \$38,600 and extension grants totaling \$24,550. While our goal is to provide education related to NAIS, records indicate that 7,103 Oklahoma livestock premises were registered in 2008. We have directly assisted in the tagging of over 27,310 animals with electronic identification tags in OSU livestock production units and youth livestock projects in 2008. In addition, we have assisted three Oklahoma companies in developing electronic livestock identification and monitoring solutions with various aspects of grant funding seeking, product testing and evaluation in 2008. Efforts have resulted in two peer reviewed extension publications, four abstracts with presentations, one manual, two in-service trainings, 4 regional producer meetings, a web article, a Oklahoma Cattlemen article, being published related to this project in 2008.

4. Associated Knowledge Areas

KA Code	Knowledge Area
315	Animal Welfare/Well-Being and Protection
307	Animal Management Systems

Outcome #2

1. Outcome Measures

Number of cattle identified in compliance with the National Animal Identification Plan
Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

Total number of producers certified as Master Cattlemen

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	445

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Beef production accounts for approximately one-third of Oklahoma's agricultural production in most years. Moreover, seventy percent of the state's 86,000 farms have some cattle and over fifty percent of the land area in OK is pasture or rangeland. Most of the cattle operations are small in size, with seventy-eight percent of the beef cow inventory in herds of fifty head or less. Smaller cattle operations have higher cost of production and are less likely to incorporate best management practices.

What has been done

The objective of this project is to enhance the biological and economic efficiency, as well as enhance the quality of life of beef cattle producers, through a comprehensive and consistent educational curriculum delivered locally. The MC Program has been a highly sought after source of economic and production information. The interdisciplinary team's major contributions to Extension programming include:

- * The Beef Cattle Manual
- * Benchmarking of cow/calf and stocker producer practices
- * The Master Cattleman programs delivered at the local level
- * Periodic in-service training for Extension educators
- * Master Cattleman Summits
- * Grant funding plus outside sponsors to support the educational efforts
- * Information sharing with colleagues in other states through presentations at regional and national meetings
- * Ongoing project evaluation.

An interdisciplinary team of state specialists, area specialists and other professionals published a Beef Cattle Manual in spring 2004, updated and reprinted it in fall 2005 and again in fall 2008. The manual contains 41 chapters addressing various business, production, and natural resource topics. Approximately 8,000 manuals have been distributed through local Extension offices, area and state meetings and from the Master Cattleman website. Requests have been filled to 25 states and 5 foreign countries.

A Master Cattleman program was developed using the Beef Cattle Manual as the primary reference. To become a 'Master Cattleman', a producer must complete twenty eight hours of instruction and successfully complete the quiz associated with each learning module. Four hours of business planning and management and four hours of marketing and risk management are part of the core requirements. Participants have 2 years to complete the program and pay a \$75 registration fee. Extension educators coordinate meetings and provide instruction in cooperation with state and area specialists. Twenty six county or multi-county extension units have had a MC Program. Though relatively more programs were initiated early in the life of the program, it continues to be a popular staple in educational programming as some counties are offering a Master Cattleman program every 2 or 3 years. One county has its 4th class underway. Some counties complete the program in a few months; most spread the offerings out over 18 months. One notable class decided that they didn't want to stop at 28 credit hours, but wanted to cover all the chapters in the manual.

Results

Approximately 650 students have enrolled in the Master Cattleman program and 445 are now graduates. Table 1 lists the number of educational sessions and program participants by year. 573 producer training sessions were held 2005-2008.

Table 1. Master Cattleman Program Participation

Year	Number of sessions and events	Number of MC Grads (cumulative)
2004	17	-
2005	231	81
2006	150	231
2007	100	426
2008	96	445
Total	573	

The MC Program has encouraged producers to make more knowledgeable decisions. Some comments from program evaluations include the following:

*'The best program OSU Extension Service has put out.'

*'Solid core subject matter that is still important to long-time ranchers.'

*'This program is designed to increase profit and improve the quality of the end product.'

*'A very good program that helps us operate more efficiently.'

*'Excellent update/refresher for experienced operators. Invaluable for someone new in business.'

*'We have learned so much and met other cattlemen. Better than a college ed.'

*'Excellent program, educational, dupes rumors and wives tales.'

*'Will have a positive impact on the quality of beef production in OK.'

*'Helping new producers to learn more aspects of cattle business.'

* 'Helped me get a foundation for raising beef and is a great contribution to OK's future.'

*'Learned about many aspects of cattle business; contacts for more info; meet others in business'

*'Great program. It is well rounded and practical. I like the parts that explained the bottom line, P&L.'

Producer quotes about the manual include: 'One of best manuals I have.' and 'Fantastic learning tool for anyone.'

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
306	Environmental Stress in Animals
121	Management of Range Resources

Outcome #4

1. Outcome Measures

Number of producers implementing improved management, grazing systems and beef production systems resulting in improved sustainability.

Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures

Number of producers implementing management programs to decrease the incidence and economic impact of BVDV and BRD

Not reporting on this Outcome for this Annual Report

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

Key Items of Evaluation

Program #2

V(A). Planned Program (Summary)

1. Name of the Planned Program

Crop Enterprises

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	13%		5%	
133	Pollution Prevention and Mitigation	4%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	6%		20%	
204	Plant Product Quality and Utility (Preharvest)	12%		10%	
205	Plant Management Systems	13%		20%	
211	Insects, Mites, and Other Arthropods Affecting Plants	18%		10%	
212	Pathogens and Nematodes Affecting Plants	5%		10%	
213	Weeds Affecting Plants	13%		5%	
215	Biological Control of Pests Affecting Plants	4%		5%	
216	Integrated Pest Management Systems	12%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	11.5	0.0	6.5	0.0
Actual	21.0	0.0	6.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
450000	0	516250	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
450000	0	516250	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2709858	0	4172935	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Wheat variety development and testing
 No-till production practices, demonstrations, conference
 Wheat quality and product development and testing
 Wheat management newsletter, website
 Canola production practices, demonstrations and field days.
 Test and demonstrate alternative cropping systems and rotations
 Improve web-based delivery of cropping systems information
 Weekly crop updates during production season
 Grower meetings/workshops
 Field/demonstration days

2. Brief description of the target audience

Wheat growers, dual-purpose wheat producers, millers, bakers, wheat importers, seed growers and dealers, wheat breeders, crop producers, potential cotton, canola and other crop producers and nutraceutical producers.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	2000	4000	0	0
2008	67492	292458	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	1

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	14	55	69

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Field Demonstrations

Year	Target	Actual
2008	30	60

Output #2

Output Measure

- Varieties of wheat released

Year	Target	Actual
2008	2	1

Output #3

Output Measure

- Crop production manuals and production newsletters

Year	Target	Actual
2008	15	25

Output #4

Output Measure

- Cotton weekly crop updates

Year	Target	Actual
2008	11	11

Output #5

Output Measure

- Cotton Web Page

Year	Target	Actual
2008	1	1

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Percentage of dual-purpose wheat acreage where first hollow stem criterion used for decision making
2	Increase in cotton production in eastern and central Oklahoma
3	Change in acreages that have crop rotations involving wheat
4	Change in fertilization and pesticide inputs due to diversified systems
5	Number of acres where minimum or no-till production practices are applied
6	Number of varieties accepted by seed producers and producers to address end-use quality issues
7	Percentage of wheat acres sown to varieties with improved pest resistance, yield potential, and end-use quality.
8	Provide locally-controlled evaluations and agronomic data for oilseed crops
9	Cotton Variety Testing and Demonstration for Improved Oklahoma Cotton Production

Outcome #1**1. Outcome Measures**

Percentage of dual-purpose wheat acreage where first hollow stem criterion used for decision making

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	45	45

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Wheat fields utilized for livestock grazing during the fall/winter and then harvested for grain by early summer are termed 'dual-purpose' wheat fields. Proper timing of livestock grazing termination at the $\frac{1}{4}$ inch First Hollow Stem (FHS) stage of growth is critical in avoiding large grain yield losses caused by overgrazing wheat pastures. Because grazing termination dates can vary greatly on a field-by-field basis due to planting date and the particular variety planted, FHS is the single best way for stocker cattle producers to determine exact times for grazing termination. Oklahoma has about 5.7 million acres of wheat planted annually, of which, about 2.5 million acres are utilized by farmers as 'dual-purpose' wheat acres.

What has been done

FHS method was developed originally by Oklahoma State University research and extension scientists. Additional, research indicates overgrazing wheat pasture by just one week can result in a decreased grain yield of up to 25% at harvest and mistiming grazing termination by two weeks will reduce the bushels of wheat at harvest by up to 60%! Given average yield, this equates into a 19 bu/ac loss. At 2008 prices, this amounts to a about \$125 per acre potential loss of income for 'dual-purpose' wheat producers or a \$312,000,000 potential annual loss for the state of Oklahoma. To help prevent these losses, we monitor first hollow stem, conduct in-service trainings, and hold grower workshops on methodology and benefits of scouting for first hollow stem.

Results

Surveys of producers indicate that between 35% and 45% of dual-purpose wheat producers in Oklahoma check their individual fields and use first hollow stem as a criterion for removal of cattle from wheat pasture. In addition, Oklahoma Cooperative Extension specialists monitor first hollow stem at two locations (Stillwater and El Reno, OK) and data are distributed to extension educators and stakeholders via electronic newsletter during the growing season. Based on newsletter response and county educator input, it is estimated that at least 80% of dual-purpose wheat producers follow these numbers and use them as a 'rule of thumb' estimator for removal of cattle from their wheat pasture. Thus, this management practice developed by OAES and delivered to producers over the last ten years by OCES personnel resulted in increased income from wheat grain in Oklahoma of between \$125,000,000 and \$230,000,000 for 2008.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #2**1. Outcome Measures**

Increase in cotton production in eastern and central Oklahoma

Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

Change in acreages that have crop rotations involving wheat

Not reporting on this Outcome for this Annual Report

Outcome #4**1. Outcome Measures**

Change in fertilization and pesticide inputs due to diversified systems

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10000	140000

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Since 1950, cropping systems in Oklahoma have tended to be monoculture systems. The lack of crop diversity has led to an increase of fertilizer and pesticide use. Until recently producers have had little incentive to not over fertilize, especially with nitrogen. Demonstration trials conducted in since 2005 indicated an average of \$14/acre benefit from sensor based nitrogen management over corn sites in NE Oklahoma. Similarly, wheat trials in NW Oklahoma showed a \$10/acre benefit using the flat N rates determined using the GreenSeeker sensor combined with the on-line Sensor Based Nitrogen Rate Calculator.

What has been done

Extension programs have been developed to diversify cropping systems and actively manage N fertilizer during the growing season. In the past, N fertilizer recommendations have not been very accurate at predicting N fertilizer needs. This is in large part due to the preceding crop N use or contribution. Fertilizer application information was recorded for 586 fields where Extension personnel had placed Ramp Calibration Strips in the fall of 2006. In 2007-2008, large scale side by side demos were placed in 13 fields spread out across the state. This will expand the adoption of sensor based nitrogen management to predict N needs of the crop regardless of previous crop. Pesticide extension programs have focused on the benefits of diversifying cropping systems.

Results

In 2008, at least 20 counties across the state reported producers using sensors and reference strips with an estimated coverage of 70,000 plus acres, that OSU extension had a part in or was responsible for. This estimate did not include the acres that were being supported by private individuals or industry, under which there are approximately 30,000 known acres and many unreported acres. In addition, there were 68 EQIP contracts (more than 40,000 acres), filled across the state for the use of the GreenSeeker(tm) Sensor and N-Rich strip as a Better Management Practice (BMP). Assuming nitrogen cost 75 cents per pound and an average savings of 30 pounds of N per acre (2006 reference strip survey), farmers saved an average of \$22.50 / acre or over \$3,150,000. The large scale side-by-side demo culminated with producer meetings in which the results were discussed length. These demos led to the establishment of a large scale on farmer field replicated studies that will allow for an in-depth analysis of N management systems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

Outcome #5

1. Outcome Measures

Number of acres where minimum or no-till production practices are applied

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	450000	1000000

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Intensive tillage has historically been used in Oklahoma to bury wheat residue following harvest. The lack of crop diversity in cropping systems in the past has not been conducive to reducing or eliminating tillage in monoculture wheat systems. Research has shown that minimum or no-till systems significantly improve water absorption and retention as well as reducing erosion. In addition, soil organic matter is often improved as well. In 2004, no-till acreage in Oklahoma was estimated to be 8% by CTIC.

What has been done

Since 2006, several trials have been initiated to identify profitable crop rotations for no-tillage cropping systems. Scientists will use these locations to characterize changes in soil chemical and physical properties (i.e. carbon sequestration rates). This collaborative project will provide researchers and Oklahoma producers with a deeper understanding of crop rotation and no-till cropping systems. This increased knowledge will hopefully lead to the increase adoption of no-till practices.

Results

In 2007-2008, a no-till cropping systems handbook was published ('No-till Cropping Systems in Oklahoma') and distributed throughout the state. To date over 4,000 copies have been distributed to producers, Extension Educators, and consultants. A minimum of 6 no-till meetings were held around the state with no fewer than a total of 800 combined attendees. In addition to local meetings, the first No-till Oklahoma (state-wide meeting) Conference was held and attended by 250 people from the southern plains region. Preliminary results of a no-till survey conducted in Oklahoma indicated that 33% of the 1,200 respondents practiced no-till. This is a substantial increase compared to the estimated 8% in 2004. In a followup, a no-till field day was attended by 61 producers representing 67,427 acres of production. When surveyed, these producers estimated the information received from OCES/OAES on no-till production at \$33 per acre. This represented a perceived value of \$2,225,000 by stakeholders at this one location alone.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
205	Plant Management Systems

Outcome #6**1. Outcome Measures**

Number of varieties accepted by seed producers and producers to address end-use quality issues

Not reporting on this Outcome for this Annual Report

Outcome #7

1. Outcome Measures

Percentage of wheat acres sown to varieties with improved pest resistance, yield potential, and end-use quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	58

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

In the winter-wheat market, farmer profitability is yield-driven while end-user value is quality driven. While yield potential and end-use quality are not mutually exclusive traits, developing and marketing cultivars that satisfy both requirements is extremely difficult. The fact that there are relatively few scientists and even fewer private companies working in the area of wheat improvement exacerbates the problem.

What has been done

The Oklahoma State University Wheat Improvement Team was developed as a cross-cutting collection of scientists who work collaboratively to develop, test, and distribute improved wheat cultivars for the Southern Great Plains. As part of this effort over 900 individual crosses are made on a yearly basis. In addition approximately 25 cultivars are evaluated in replicated small grain performance trials at 24 sites throughout Oklahoma. Farmers are involved in both of the processes through advisory organizations and direct participation in research trials.

Results

The hard-white wheat cultivar OK Rising was released in 2008. This was the first white wheat with sufficient sprouting tolerance and disease resistance to allow production throughout the entire state of Oklahoma.

Current yield and quality comparisons of popular wheat cultivars were delivered directly to over 8,000 stakeholders in the state of Oklahoma.

Acreage of the disease-susceptible varieties Jagger and Jagalene dropped from 58% to 48% of planted acreage. In contrast, acreage of the improved varieties (developed and tested at OSU) Endurance, Overlay, and OK Bullet increased from 7% (2004) to 24% (2008) of planted acres. These changes resulted in improved quality and reduced grain losses. In addition to improved end-user quality, these three improved varieties developed by OAES and tested and extended by OCES averaged three bushels per acre more in 2008 than the traditional varieties. Thus the 17% increase on 5.6 million acres of wheat at average 2008 prices resulted in over \$18.5 million of added income for Oklahoma producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #8**1. Outcome Measures**

Provide locally-controlled evaluations and agronomic data for oilseed crops

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	30

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Genotype by environment interactions are the overriding factor determining yield and many end-use quality parameters. Therefore, stakeholders require locally-controlled, research-based quantitative comparisons of crop cultivars commonly grown in the southern Great Plains. Many of these oilseed crops have not been grown in Oklahoma and lack of production knowledge has been cited as a reason for not planting some of these crops. In addition stakeholders need the opportunity to evaluate new cultivars and advanced experimental lines in 'real world' settings.

What has been done

Replicated performance trials have been established across Oklahoma to evaluate peanut, winter canola, sunflower, and soybean cultivars. In addition to cultivar performance trials, trials have been initiated to develop basic agronomic recommendations for several oilseed crops. Scientists will use the information collected from all of these trials to develop agronomic recommendations. In turn, these recommendations will be used to educate producers on profitable crop production practices.

Results

Thirty locations around Oklahoma were utilized to evaluate cultivars for the major oilseeds produced in Oklahoma. Total individual plots planted and harvested was 1,974. Grain yield and other agronomic data for each variety of each crop were collected and distributed to stakeholders throughout the southern Great Plains. Over 1,000 stakeholders directly participated in field day activities at these research sites. Performance test data is among the most frequently requested and most highly valued data requested by stakeholders each year. In addition to Performance trials, data was collected from research plots to develop basic agronomic recommendations (Nitrogen management, seeding rate, and planting date) for sunflower production in Oklahoma. This information is readily accessible and has the potential to be utilized by thousands of producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

Outcome #9**1. Outcome Measures**

Cotton Variety Testing and Demonstration for Improved Oklahoma Cotton Production

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Cotton varieties are being developed by seed and technology companies, but little is known about how the variety will perform under Oklahoma climate and cultural systems. The varieties need to be demonstrated in all cotton production systems to determine their best fit.

Variety testing locations are determined by working with county extension educators in cotton producing areas.

What has been done

Cooperators are selected depending on their specific location and cultural system to allow the maximum number of areas and soils represented. Seed companies are then contacted and asked to suggest and rank their best varieties for the program, and 20 irrigated and 24 dryland varieties are selected to participate in the tests. Approximately 6 irrigated and 6 dryland demonstrations are selected according to location and inputs from county educators. Yield, ginning percentage, and fiber quality are determined for each variety and data are analyzed using standard analysis of variance. Results are distributed in a report made available to cotton gins and county extension offices, plus information is reported on the NTOKCotton.org web site (23,778 hits in 2008).

Results

USDA Agricultural Marketing Service in Memphis, Tennessee has a report titled: Cotton Varieties Planted, 2008 Crop. This report lists the percentage of each variety planted per state. For the 2008 crop, varieties that had an overall ranking in the top six in the OSU variety tests were planted on 66 percent of the total acres planted in Oklahoma. Oklahoma planted 170,000 acres of cotton in 2008, so these top six varieties were planted on 112,200 acres. The average yield of the top six varieties over all experiments was 1238 lbs. lint, as compared to the average yield of all varieties tested of 1097 lbs lint. At the base price of cotton, planting top performing varieties increased yield of 141 pounds of cotton lint per acre. At a base price of \$0.52 per pound of lint, the average return to Oklahoma's cotton farmers by planting recommended varieties was \$73.32 in 2008. There were 112,200 acres planted to these recommended varieties, with an economic impact of \$8,226,504.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

V(H). Planned Program (External Factors)**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Public Policy changes
- Government Regulations

Brief Explanation**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)

Evaluation Results

Preliminary results of a no-till survey conducted in Oklahoma indicated that 33% of the 1,200 respondents practiced no-till. This is a substantial increase compared to the estimated 8% in 2004.

Key Items of Evaluation

This means less fuel usage, reduced wind erosion and better soil moisture retention.

Program #3

V(A). Planned Program (Summary)

1. Name of the Planned Program

Plant Biological Technologies

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
123	Management and Sustainability of Forest Resources	0%		5%	
132	Weather and Climate	0%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		25%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		13%	
206	Basic Plant Biology	0%		14%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	0%		33%	
Total		0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	6.0	0.0
Actual	0.0	0.0	7.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	602292	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	602292	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	4868424	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Design and conduct research, including the development of methods and procedures
- Write and submit grant proposals to private, state and federal agencies
- Generate scientific publications - communicating scientific results to a wide range of scientists
- Training of professional scientists - graduate and undergraduate students, technicians and post docs in the scientific discipline
- File patents

2. Brief description of the target audience

- Scientists and scientific societies
- Governmental science organizations
- Educational institutions
- Applied researchers and extension specialists
- Students
- Private, federal, state, and industrial funding agencies
- Other stakeholders (producers, consumers, educators, public)

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	75	125	50	0
2008	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	1
2008 :	1

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	0	32	32

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals written and submitted

Year	Target	Actual
2008	20	26

Output #2

Output Measure

- Peer-reviewed publications including journal articles

Year	Target	Actual
2008	25	20

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Graduate students graduated
2	Biosafety.

Outcome #1**1. Outcome Measures**

Graduate students graduated

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	14	9

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Aphid feeding on crop plants cause significant crop losses resulting in higher food costs.

What has been done

A single dominant aphid resistance gene was found to confer multiple resistance to aphids and plant pathogens.

Results

Changes were recorded in expression of a transcription factor that is a key integrator between ethylene and JA pathways with affects on plant resistance to multiple pests.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

Outcome #2**1. Outcome Measures**

Biosafety.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Fresh vegetable producers and consumers demand human pathogen-free produce. Although of only rare occurrence, human populations have been affected by pathogens transferred through fresh produce. Ways and means to provide safe and healthful fresh produce to consumers are necessary and have to be reevaluated and managed as the production systems change with intensity and size of scale of production to meet growing population demands.

What has been done

A new research initiative resulted in the development of the National Institute for Microbial Forensics and Agricultural Biosecurity in collaboration with the Oklahoma Department of Agriculture, Food and Fiber, the Department of Homeland Security and USDA. An interdisciplinary team of scientists was contracted by a fresh produce consortium in California to determine possible modes of transport of human pathogens into the fresh food system.

Results

Results of this work indicated modes of transfer and producers in the region made changes in production patterns that will lower probabilities of pathogen transfer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
212	Pathogens and Nematodes Affecting Plants
211	Insects, Mites, and Other Arthropods Affecting Plants
201	Plant Genome, Genetics, and Genetic Mechanisms

V(H). Planned Program (External Factors)**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Other (Announcement of NSF Science and Technology Center competition. Realization that NEON program has been implemented. Federal regulatory changes have affected the ability to work on some biosecurity issues.)

Brief Explanation**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- During (during program)

Evaluation Results

Research project proposals were evaluated by science peer review panel and one NSF Center project was selected to be forward for further consideration for funding.

Key Items of Evaluation

Program #4

V(A). Planned Program (Summary)

1. Name of the Planned Program

Commercial and Consumer Horticulture

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
124	Urban Forestry	5%		10%	
202	Plant Genetic Resources	6%		10%	
204	Plant Product Quality and Utility (Preharvest)	15%		15%	
205	Plant Management Systems	35%		40%	
502	New and Improved Food Products	7%		20%	
901	Program and Project Design, and Statistics	10%		5%	
903	Communication, Education, and Information Delivery	22%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	14.0	0.0	2.6	0.0
Actual	20.0	0.0	2.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
410269	0	172083	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
410269	0	172083	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1507013	0	1390978	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct research to evaluate cultivars of traditional and nontraditional horticultural crops and ornamental plants.
- Conduct research into crop cultural systems, particularly the feasibility of horticultural crops in rotation with agronomic crops.
- Conduct research to develop "seed to market" production systems for high-value alternative horticultural crops like cilantro and herbs.
- Conduct research to develop sustainable and/or organic production systems for commercial horticultural crops.
- Provide demonstrations and education and disseminate information to support Oklahoma's commercial horticulture industry, with emphasis on electronic resources.
- Survey Oklahoma Consumers (Gardeners) to assess the needs and wants of the gardening public
- Upgrade the web-based delivery
- Review and revise annually or as needed Fact sheets and other publications.
- Educational programs are conducted based on public interest and County Educator requests.
- Participate and support eXtension Consumer Horticulture/Master Gardener Community of Practice
- Conduct Master Gardener/Junior Master Gardener Training
- Conduct pesticide training and education
- Assist in Youth at Risk – Obesity/School Gardens

2. Brief description of the target audience

Horticultural crop producers, commodity groups, food processors, landscape professionals, input suppliers such as seed and chemical companies, peer scientists, extension specialists and county professionals, horticultural dealers and merchants, greenhouses, Master Gardeners, home owners, communities, and youth.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	100000	1000000	2000	0
2008	81560	1630000	2005	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	3	5	8

V(F). State Defined Outputs

Output Target

Output #1**Output Measure**

- New Master Gardeners trained

Year	Target	Actual
2008	300	256

Output #2**Output Measure**

- Manuscripts submitted for consideration of publication in peer-reviewed journals

Year	Target	Actual
2008	3	7

Output #3**Output Measure**

- Number of Extension publications completed - fact sheets, newsletters, trial reports, web-based materials

Year	Target	Actual
2008	6	55

Output #4**Output Measure**

- Number of statewide "Oklahoma Gardening" shows produced

Year	Target	Actual
2008	30	35

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Number of horticultural crop producers newly certified as organic
2	Number of volunteer hours provided to community horticulture programs statewide
3	Number of home gardeners experiencing increased awareness and knowledge about environmental issues and IPM principles
4	Use of Growing Source of By Products as organic fertilizer
5	Viticulture Research and Extension

Outcome #1**1. Outcome Measures**

Number of horticultural crop producers newly certified as organic

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	2	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #2**1. Outcome Measures**

Number of volunteer hours provided to community horticulture programs statewide

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	14000	56956

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rapid urban growth in many areas of the United States coupled with increased interest in the environment and home gardening have prompted an ever-increasing number of garden and landscape inquiries. Along with this interest, comes a multitude of gardening questions needing individual explanation and too few Extension staff members to answer each question. Many of these questions are seasonal in nature and are relatively easy to answer assuming that one has horticulture training.

What has been done

Oklahoma Master Gardeners are trained, supervised and recruited to: 1) improve overall efficiency in providing one-on-one service to the non-commercial horticulture clientele in the county, 2) provide group learning and teaching activities for non-commercial clientele, 3) allow agents to develop proactive Extension programs, and 4) form a group of Extension volunteers to support additional consumer horticulture efforts.

Trainees participate in a 10 - 13 week course receiving between 40 - 56 hours of course work on subjects including: basic plant science, vegetables, fruits, nuts, ornamentals, lawns, diagnosing pest problems, soils, and other related topics. Upon completion of the training period, satisfactorily passing an exam on materials and topics covered, and donating between 40 - 56 hours of volunteer time to the Horticulture program, the trainees are certified and awarded the title of Oklahoma Master Gardener.

Results

Examples of Master Gardener Volunteer activities include: staffing plant clinics to answer phone and walk-in questions, manning educational exhibits, maintaining demonstration gardens, community beautification projects, serving as 4-H horticulture leaders and judges, speaking at club/civic meetings, teaching horticulture activities at nursing homes, etc., assisting in horticulture mailings, newsletters, etc., and appearing on TV and radio.

The service from the Master Gardener volunteer program has proven to be a highly popular means of extending the knowledge of the Oklahoma State University Cooperative Extension Service to the residents of Oklahoma. The Oklahoma Master Gardener Program now has 26 counties participating in the program as of January 2009. The following data was provided by 19 of the 26 counties. Approximately 256 new Master Gardeners were trained during the 2008 training season. Close to 1,064 active Master Gardeners volunteered their time, contributing approximately 56,956 hours of volunteer service and reaching over 2,180,122 Oklahomans with as many as 1,000+ educational and community programs and activities being conducted in their communities in 2008. This translates to over \$893,070 in service that was donated by volunteers (wage rate of \$15.68/hour was used, which includes a 12% estimate of fringe benefits. This hourly rate is the assigned wage for nonagricultural workers in 2006 for the state of Oklahoma as published in the Economic Report of the President. The Independent Sector, an organization that 'serves as a national forum to encourage giving, volunteering and not-for-profit initiative,' supplied this information). Reports are gathered yearly at the beginning of the following year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
903	Communication, Education, and Information Delivery
205	Plant Management Systems

Outcome #3

1. Outcome Measures

Number of home gardeners experiencing increased awareness and knowledge about environmental issues and IPM principles

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	2500	175380

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Public concern for the environment continues to increase. Traditional landscape management practices have involved extensive use of pesticides, fertilizers, and other materials that could harm the environment if not used properly.

What has been done

IPM workshops, educational programs/seminars, Master Gardener training, and segments of Oklahoma Gardening are used to educate the public of IPM practices.

Results

Homeowners are better educated and can make choices in maintaining the landscape that are more environmentally friendly. In addition, 125 commercial growers/retailers received IPM training - these will influence consumers and final users.

4. Associated Knowledge Areas

KA Code	Knowledge Area
903	Communication, Education, and Information Delivery
124	Urban Forestry
202	Plant Genetic Resources
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

Outcome #4

1. Outcome Measures

Use of Growing Source of By Products as organic fertilizer

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

This research during the past year focused on the use of cottonseed and canola meal as organic fertilizers for landscape plantings. During extraction of oil for food purposes, one Oklahoma cottonseed mill estimated that they produced more than 50,000 metric tons of cottonseed or canola meal during a typical year while extracting oil for cooking purposes. With costs of petroleum fuels increasing, cottonseed and canola are being investigated as potential biofuel sources. The amount of meal produced as a byproduct will increase as biofuels become more accepted, making meal disposal more challenging.

What has been done

Our research showed that no difference in plant growth of marigolds or redbud trees fertilized with cottonseed meal, canola meal, or commercial fertilizer occurred. Soil analyses from plots of each treatment are currently being performed. Results suggest that cottonseed meal and canola meal can provide necessary plant nutrients over time as the materials degrade in the soil.

Results

This is an advantage over standard commercial fertilizers in which the nutrients are rapidly released and often leach from the root zone with heavy rains or irrigation resulting in environmental concerns as well as loss of money for growers. Retail price of cottonseed and canola meal ranges from about \$1.74/kg to \$3.83/kg. At this price, the sale of 50,000 metric tons as organic fertilizer could result in potential income of \$87 to \$191 million for extraction mills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)

Outcome #5

1. Outcome Measures

Viticulture Research and Extension

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	500

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

The Oklahoma grape industry has experienced a resurgence of interest and enthusiasm over the last decade. Interest has come from wineries, grape growers, and others interested in economic development. Much of the total economic development potential comes from tourism and spin off sales associated with the wineries which tend to be located in smaller communities. Potential exists for Oklahoma vineyards and wineries to add value to the Oklahoma economy by producing grapes and making and selling wines locally. Recent estimates put the US grape crop farm-gate value at more than \$3 billion from nearly 1 million acres with a total annual economic impact of \$50 billion dollars. Oklahoma currently has 597 acres of grapes and more than 50 wineries.

What has been done

In 2000 a team of Extension specialists was assembled to develop an educational program for Oklahoma grape producers. The core team consisted of specialists from Horticulture, Entomology and Plant Pathology. Key support has also been provided by specialists in soils, irrigation and agriculture economics who have assisted with instruction and contributed to development of educational materials. As a result of this team effort the Oklahoma Grape Management Course has been designed and offered nine times. The course meets seven times per year for a period of four hours. A comprehensive viticulture education program was also started, incorporating courses being taught at OSU-Stillwater, OSU-OKC, Tulsa Community College, and through OSU cooperative extension. Statewide meetings for grape growers have been held in various locations throughout Oklahoma involving almost 500 participants in 2008. A grape-related newsletter was initiated in 2006 with a subscriber ship of more than 50, an Oklahoma Grape and Wine Website was initiated in 2007, economic budgets have been prepared to assist potential grape growers with decision making, and numerous publications have been distributed.

Demonstration/research projects are on-going to secure reliable data on grape variety adaptability and pest management requirements in Oklahoma. Competitive grant proposals have been submitted to various funding agencies including CSREES, OCAST, IR-4, EDGE, NABGA, and internal OSU funding opportunities to procure greater than \$200,000 in funds.

Results

The 2007 Census of Agriculture has shown that since the Oklahoma Grape Management Course started OK grape acreage has increased from less than 50 to roughly 600 and the number of licensed wineries has increased from about 2 to 51. Based on the acreage total, 327,000 grape vines are currently planted, encompassing 33 counties. Almost 600 people, including 15 county extension educators, have taken the Oklahoma Grape Management Course its first nine years. Thirty-four persons participated in the 2008 course and 49 are signed up for the 2009 course. As a result of this educational program, potential grape growers from 50 counties have learned about the economic potential of wine grapes, how to reduce environmental risk through proper variety selection, how to accurately scout for insects and diseases, and how to install and manage a vineyard. The viticulture research and extension program has delivered 4 professional papers, 5 professional posters, 42 public presentations, 3 refereed publications, 9 abstracts, 3 non-refereed articles, 11 extension publications, and 3 volumes with 12 editions of the grape newsletter with 41 separate articles since 2006. Much of this work is available through the OSU Department of Horticulture and Landscape Architecture website and the OSU Viticulture and Enology website (www.grapes.okstate.edu). Data have been collected from research and demonstration plantings on grape variety adaptability, as well as insect and disease incidence since 2003 and results are disseminated to growers through the OSU Viticulture and Enology website as well as the Grape Management Short Course. In 2008 alone, 20 attendees of the grape management short course estimated initial savings from taking the course to be between \$113,000 and \$122,000. This averages to roughly \$6,000 per person. When taken over the life of the course, this may equate to \$3.6 million dollars saved in initial costs alone.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought,weather extremes,etc.)
- Economy
- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration,new cultural groupings,etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- During (during program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #5

V(A). Planned Program (Summary)

1. Name of the Planned Program

Ecosystem and Environmental Quality and Management

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
104	Protect Soil from Harmful Effects of Natural Elements	7%		10%	
111	Conservation and Efficient Use of Water	8%		10%	
112	Watershed Protection and Management	10%		10%	
121	Management of Range Resources	10%		15%	
123	Management and Sustainability of Forest Resources	7%		10%	
133	Pollution Prevention and Mitigation	9%		10%	
134	Outdoor Recreation	8%		0%	
135	Aquatic and Terrestrial Wildlife	10%		5%	
136	Conservation of Biological Diversity	5%		5%	
205	Plant Management Systems	10%		10%	
403	Waste Disposal, Recycling, and Reuse	10%		5%	
605	Natural Resource and Environmental Economics	6%		10%	
Total		100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	7.4	0.0	8.0	0.0
Actual	9.0	0.0	6.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
380000	0	516250	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
380000	0	516250	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
958705	0	4172935	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Design and conduct research
- Submit grant proposals
- Produce scientific publications
- Specialty conferences to address environmental issues of concern to Oklahoma,
- An Environmental Quality and Waste Management publications series
- A website that expands upon the information presented in the publication series, providing the range of information
- A high-visibility symposium series will share high quality research and extension programs with technical and lay audiences.
- Poultry Waste Management Education
- Water Quality educational programs

2. Brief description of the target audience

Scientists, students, related agencies (Federal, State, private), land owners, farmers, ranchers, communities, consumers, land developers, state legislators, commodity groups, community leaders

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	475	5525	175	175
2008	15300	60000	5020	2700

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	0	70	70

V(F). State Defined Outputs**Output Target****Output #1****Output Measure**

- Grant proposals written and submitted

Year	Target	Actual
2008	11	78

Output #2**Output Measure**

- Manuscripts submitted for consideration of peer-reviewed publication

Year	Target	Actual
2008	24	123

Output #3**Output Measure**

- Extension conferences, workshops and training sessions

Year	Target	Actual
2008	25	41

Output #4**Output Measure**

- Research and Extension reports and fact sheets

Year	Target	Actual
2008	5	15

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Number of poultry producers and poultry litter applicators acquiring initial waste management certification and number maintaining certification
2	Percentage of poultry producers using at least one waste management BMP
3	Number of acres applying BMPs (including prescribed burning) for Ecosystem restoration of native prairies, shrublands and forests
4	Number of manure test conducted for land application by confined animal operations
5	Percentage of poultry operations conducting soil testing at least every other year
6	Peer-reviewed publications
7	Red Cedar Encroachment in Cross Timbers forests
8	Prescribed Burning for Ecosystem Restoration and Management

Outcome #1**1. Outcome Measures**

Number of poultry producers and poultry litter applicators acquiring initial waste management certification and number maintaining certification

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1200	1157

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Concerned Oklahoma citizens hope that P inputs into waterways will be reduced due to proper poultry litter land application practices.

What has been done

Nine Initial 9-Hour Training sessions were presented (81 hours of classroom instruction); twenty-five continuing education training sessions (75 hours of classroom instruction).

Nine Initial 9-Hour Training sessions were presented during Calendar Year 2008 (1516 people-hours), and one hundred sixty-seven new people were trained as poultry operators or waste applicators between January 1, 2008, and December 31, 2008. Of those, 160 were Oklahomans. Nine hundred ninety individuals completed Annual Update Training between January 1, 2008, and December 31, 2008, attending twenty-five continuing education training sessions (75 hours of classroom instruction) during the training year.

Results

167 new people were trained as poultry operators or waste applicators, 990 maintained certification. Eight paired pre- and post-tests performed at the Initial 9-Hour Training Sessions contained 6 to 10 questions. While the average score on the pre-tests was 72%, the average score on the post-tests was 86%, indicating that the producer audience gained information and knowledge about waste management and pollution control. This pre-post assessment has not been finalized.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
403	Waste Disposal, Recycling, and Reuse
133	Pollution Prevention and Mitigation
205	Plant Management Systems

Outcome #2**1. Outcome Measures**

Percentage of poultry producers using at least one waste management BMP

Not reporting on this Outcome for this Annual Report

Outcome #3**1. Outcome Measures**

Number of acres applying BMPs (including prescribed burning) for Ecosystem restoration of native prairies, shrublands and forests

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1200000	50000

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Invasive species cost the citizens of the United States approximately \$137 billion per year. These species impact water, agriculture, recreation and other important economic activities in the state.

What has been done

There are over 50,000 non-indigenous species in the United States that cause major environmental damage and losses totaling approximately \$137 billion per year. (Pimentel et al., 2000). Some of these non-indigenous species are from intentional introductions of plants for agricultural or horticultural purposes. Our project focused on managing exotic species that were introduced as forages and have become invasive on rangeland ecosystems. We argue that these species are unique because they were introduced for grazing as monocultures but are invading rangelands causing environmental problems and diminishing the economic value of production on these ecosystems. Our project focuses on using grazing to alter distribution and species selection of herbivores to control the rate of invasion from 4 species in the central Grasslands of North America.

Results

This project has led to the development of new options for cost share through the Environmental Quality Incentives Program (EQIP) through USDA-NRCS. From 1997 to 2002, EQIP has entered into 117,625 contracts on more than 51.5 million acres and obligated nearly \$1.08 billion to help land owners advance stewardship on working agricultural lands. Additionally, we have educated individual land owners, as well as agency employees from the NRCS, USFS, USFW, BLM and numerous state agencies throughout Texas, Oklahoma, Kansas, Missouri, Iowa, Nebraska, Colorado, Wyoming, New Mexico and other states. Many of these individuals have altered their actions and have begun to practice our approach to managing rangelands. Two high profile examples are the Wichita Mountains Wildlife Refuge in Oklahoma and the Charles M. Russell Wildlife Refuge in Montana have built their current conservation plans around our research. These represent two large and historic land holdings that have benefitted substantially from this research. Additionally, numerous private land owners have applied our research to their landscapes to more efficiently control invasive species, enhance biological diversity and sustain livestock production.

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity
123	Management and Sustainability of Forest Resources
121	Management of Range Resources
205	Plant Management Systems

Outcome #4**1. Outcome Measures**

Number of manure test conducted for land application by confined animal operations

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1500	677

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)****What has been done****Results****4. Associated Knowledge Areas**

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
112	Watershed Protection and Management
205	Plant Management Systems

Outcome #5**1. Outcome Measures**

Percentage of poultry operations conducting soil testing at least every other year

*Not reporting on this Outcome for this Annual Report***Outcome #6****1. Outcome Measures**

Peer-reviewed publications

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	14	73

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Sediment remains one of the main causes of water quality degradation in this country. Recent research has indicated that the majority of the sediment load in streams and rivers originates from stream banks in many watersheds. Ground-water seepage may be an important process contributing to streambank erosion and bank failure, but its role is not currently well understood.

What has been done

This project has quantified hydrologic, soil, and geotechnical characteristics and processes affecting seepage erosion using an innovative two-dimensional lysimeter and a three-dimensional soil-block model, simulating conditions along banks of two streams in Mississippi. From the lysimeter experiments, an empirical sediment transport function was proposed and evaluated. The sediment transport function has been incorporated into the USDA-ARS Bank Stability and Toe Erosion Model (BSTEM) to investigate the importance of seepage erosion and undercutting, bank angle, soil pore-water pressure, and root reinforcement in predicting bank shear strength and slope stability.

Results

This research has led to a greater fundamental understanding of the role of seepage and groundwater on bank and hillslope failure. Seepage becomes a prominent bank failure mechanism on unsaturated to partially saturated stream banks with root reinforcement, even with undercutting distances as small as 20 cm. At its conclusion, the research will develop an integrated bank stability/riparian ground-water model that will serve as a critical tool for stability analyses in stream rehabilitation by considering site-specific bank-failure processes such as seepage erosion, which researchers suggest as being critical for stream channel rehabilitation. This research has been supported by a 2005-2009 USDA CSREES National Research Initiative grant that has assisted in the educational training of one Ph.D. student, one M.S. student, and two undergraduate students. Seven manuscripts on this work have been published in peer-reviewed, refereed journals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity
133	Pollution Prevention and Mitigation
123	Management and Sustainability of Forest Resources
121	Management of Range Resources
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
205	Plant Management Systems
403	Waste Disposal, Recycling, and Reuse

Outcome #7

1. Outcome Measures

Red Cedar Encroachment in Cross Timbers forests

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Cross Timbers vegetation type covers 4.8 million hectares. We seek to determine the magnitude and geographic distribution of the threat of redcedar encroachment in Cross Timbers forests. This threat is well documented for grasslands and savannahs but little is known about the threat to forests. We propose to capitalize on a rare opportunity to evaluate changes in eastern redcedar encroachment and stand structure in Cross Timbers forests by re-measuring stands across the entire vegetation type for the first time after 50 years. The results will provide information for preparing a larger more comprehensive proposal concerning threats to the integrity and productivity to one of the largest vegetation types in Oklahoma.

What has been done

We re-measured Cross Timbers forests after 50 years and found that invasive species (*J. virginiana*) and factors related to succession and *Quercus* spp. decline were contributing to the conversion of *Quercus* -dominated forests to forests with less *Quercus* spp., more mesophytic species and greater species richness in the absence of fire. These phenomena are increasingly common globally in *Quercus*-dominated forests.

Results

Total and Quercus stellata basal area and tree density increased, but Q. stellata sapling density decreased. Juniperus virginiana and species richness increased for all measures, while Q. marilandica sapling density and importance value decreased. We used detrended correspondence analysis (DCA) separately on basal area, tree density and sapling density to detect changes in species composition. DCA results indicated that re-sampled stands generally changed from Q. stellata-Q. marilandica dominated forests to forests with greater species richness and more J. virginiana. Q. marilandica dominance was reduced primarily by the presence of J. virginiana in western stands and a variety of species in central and eastern stands. Q. stellata remained a dominant tree species, but composition otherwise shifted towards mesophytic forest species.

The preliminary results demonstrated an east-west gradient of variation in change corresponding to the precipitation gradient. Dendroecological studies of changes in stand composition and possible links to weather will be conducted to better understand and predict changes in forest composition and structure. The tree ring data will be analyzed to reconstruct stand history including the timing of death of trees, entry of new trees into the stand and response to weather events such as drought that may kill trees and open the stand to invasive juniper.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #8

1. Outcome Measures

Prescribed Burning for Ecosystem Restoration and Management

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Red cedar and other invasive species tend to dramatically reduce forage production, wildlife habitat, water availability while at the same time increasing wildfire danger. The results are a significant economic and risk burden for agricultural producers, rural and suburban communities, recreational users and others.

What has been done

Six Prescribed Burn Associations have been developed to help landowners gain experience and equipment for conducting prescribed burns. Training and information are provided and weather-fire models are provided through the Oklahoma Mesonet. Training and education concerning prescribed burning is also provided to landowners and fire departments outside of the associations.

Results

Last year just the six Prescribed Burn Associations alone conducted 78 fires on over 50,000 acres. This does not include thousands of other acres using OSU prescribed burn techniques during 2008. Analysis of range rental for grazing, rental rates for recreation, and NRCS information indicate that Prescribed Burning of rangeland can increase income per acre between \$10 and \$35 beyond the cost of burning depending on the location and use of land. Thus if we use an average return of \$22.50 per acre, the return to just the 50,000 acres in the associations is estimated to be \$1,125,000 during 2008.

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity
121	Management of Range Resources

V(H). Planned Program (External Factors)**External factors which affected outcomes**

- Natural Disasters (drought,weather extremes,etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals,group,organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #6**V(A). Planned Program (Summary)****1. Name of the Planned Program**

Food Processing, Product Storage, and Food and Product Safety

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
216	Integrated Pest Management Systems	10%		5%	
401	Structures, Facilities, and General Purpose Farm Supplies	7%		5%	
403	Waste Disposal, Recycling, and Reuse	5%		5%	
501	New and Improved Food Processing Technologies	15%		10%	
502	New and Improved Food Products	10%		10%	
503	Quality Maintenance in Storing and Marketing Food Products	15%		15%	
701	Nutrient Composition of Food	6%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	20%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	5%		20%	
723	Hazards to Human Health and Safety	7%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	1.3	0.0	1.9	0.0
Actual	5.0	0.0	3.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
49313	0	258125	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
49313	0	258125	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
952902	0	2086467	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct research that evaluates food processing technologies with the aim of improving food value, quality, and safety. Provide technical applications, demonstrations and education for food processors. •Develop rapid detection methods for one family of allergens and one bacterial toxin. Pecans will serve as our allergen model while *Staphylococcus* enterotoxin will provide our biotoxin model. Our program will use two approaches. Immunomagnetic affinity and recovery will be used to develop a mechanism to bind and recover allergen- and enterotoxin-derived particles directly. Then a combination of oligo-tagged secondary antibodies and PCR amplification will be used to amplify the detection signal and allow for rapid detection methods. •Conduct research that evaluates agricultural product storage and handling technologies with the aim of improving quality, safety, and costs. Provide technical applications, demonstrations and education for grain and food storage providers and handlers.

2. Brief description of the target audience

food processors; handlers, manufacturers, and marketers of grain, feed and food; food safety regulators

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	500	6000	0	0
2008	6060	27100	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	1
2008 :	1

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	15	22	37

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer-reviewed journal articles

Year	Target	Actual
2008	5	20

Output #2

Output Measure

- Number of conferences and other extension outreach presentations

Year	Target	Actual
2008	8	69

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Number of processors and/or regulatory agencies implementing new rapid testing methods
2	Number of food processors implementing new technologies or technology improvements
3	New products produced
4	Grain storage, food or pest control entities adopting new process or product

Outcome #1**1. Outcome Measures**

Number of processors and/or regulatory agencies implementing new rapid testing methods

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	2

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Evidence has been found indicating the possibility that *Escherichia coli* 0157:H7 may be internalized into growing spinach plants. The occurrence of microbial pathogens inside leaves of vegetables would greatly increase the risk of food-borne illness. Although it is not likely that such incidents were the primary cause the outbreaks of food-borne illness attributed to fresh spinach in recent years, certainly if pathogens are inside leaves of greens it would be very difficult to sanitize the vegetable to be used for fresh consumption.

What has been done

What has been done

Preliminary experiments have shown that it is possible for *E. coli* 0157:H7 to internalize into spinach plants during growth. However, this did not occur with great frequency with the methods we used to expose the plants to the pathogen. Greater occurrence may have occurred had we used a different approach to expose the plants to the pathogen. In these experiments we either applied an aqueous suspension of *E. coli* 0157:H7 to soil surrounding roots or directly onto the leaves of young spinach plants. Related experiments have shown that generic *E. coli* can remain viable in soil used for growing spinach for several weeks. Research is continuing to evaluate different approaches of exposing the plants to the pathogen.

Results

Results

Fresh produce has potential of being sources of food borne pathogens being introduced into the food supply. A clearer understanding of how the pathogens interact with the plants may provide information to enable the food production and processing industries to better supply a safe supply of fresh produce.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
501	New and Improved Food Processing Technologies

Outcome #2**1. Outcome Measures**

Number of food processors implementing new technologies or technology improvements

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	2	3

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Reducing the sodium content of fresh meat.

Sodium based ingredients, such as sodium chloride and sodium tripolyphosphate (STPP), are typically added to muscle foods to enhance flavor, increase food safety, reduce lipid oxidation and alter protein functionality. These functions are critical to perceived quality and consumer acceptability. Unfortunately, these same ingredients are also detrimental to human health; consuming high levels of sodium has been linked to hypertension which in turn can affect both cardiovascular and kidney function. Hypertension and its associated ills are a growing healthcare problem. Processed foods have been estimated to contribute 77% of all sodium in the U.S. diet and when sources are categorized, meat products contribute the most. Thus, reducing sodium in fresh meat that is injected with brines will have a positive impact on hypertension and cardiovascular health.

What has been done

We have investigated removing and or reducing a significant source of sodium in fresh meat products, STPP, with a non-sodium based alkaline agent, ammonium hydroxide. We have looked at different concentrations of ammonium hydroxide in the enhancement brine (0.1% and 1%). We have looked at combining ammonium hydroxide with an over 75% reduction in STPP. We have used commercially based STPP enhancement brines used to inject fresh meats as the standard by which to compare the ammonium hydroxide based brines. Results demonstrate 1% ammonium hydroxide in the injection brine is very competitive with STPP.

Results

Commercially STPP injected steaks have about 325 mg of sodium added if they are 4 oz. A 12 oz steak would have about 970 mg sodium. Removal of STPP from fresh meat injection brines will reduce the total sodium being introduced into fresh meats by about 50%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
723	Hazards to Human Health and Safety
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
501	New and Improved Food Processing Technologies
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sourc

Outcome #3**1. Outcome Measures**

New products produced

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The eggs of paddlefish harvested in Oklahoma have typically been a wasted product that was used for bait or discarded. This represented a substantial loss of potential revenue as paddlefish eggs are considered high-quality caviar and have substantial market value when properly processed and sold. Capturing this revenue stream allows for (1) Improving the management of Oklahoma's paddlefish population; (2) Expanding existing paddlefish research programs; (3) Improving the experience of the paddlefish angler; (4) Promoting food safety; and, (5) Creating a self-funded program.

What has been done

The Oklahoma Wildlife Department was the project sponsor. In 2007 a complete feasibility study for a mobile paddlefish processing center was completed. It included a business plan and marketing study with a process design and layout, equipment list, budget, facility layout, and utility estimates. The facility was built in late 2007 and installed at Twin Bridges State Park. It entered into full production in the 2008 paddlefish season. In late 2008 we evaluated the results and used them to help design and plan a fixed facility that will be built by contractors working for the ODW. Since 2008 a Senior Design team has been working on plans for value-added processing of byproducts.

Results

The funds generated by the program are used for research and management of paddlefish and law enforcement. Income for the first year of operation of the paddlefish processing facility was over \$1 million. The new fixed-facility will increase income far beyond this level in the future. A great deal of research information has been collected on the species and ODW believes that the welfare of the paddlefish has improved as a result.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
701	Nutrient Composition of Food
723	Hazards to Human Health and Safety
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
503	Quality Maintenance in Storing and Marketing Food Products

Outcome #4**1. Outcome Measures**

Grain storage, food or pest control entities adopting new process or product

Not reporting on this Outcome for this Annual Report

V(H). Planned Program (External Factors)**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- After Only (post program)
- Before-After (before and after program)
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #7

V(A). Planned Program (Summary)

1. Name of the Planned Program

Family Resiliency and Economic Well-Being and Human Nutrition and Health

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
602	Business Management, Finance, and Taxation	4%		0%	
607	Consumer Economics	7%		0%	
703	Nutrition Education and Behavior	17%		0%	
724	Healthy Lifestyle	16%		0%	
801	Individual and Family Resource Management	16%		0%	
802	Human Development and Family Well-Being	30%		0%	
806	Youth Development	10%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	36.4	0.0	0.4	0.0
Actual	43.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
913000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
913000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
5298533	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Development of new curricula
- Adaptation & supplementation of existing curricula
- Development of marketing plan and materials
- Development of surveys, evaluation tool
- Searching out and applying for appropriate grants
- Delivery through classes, One-on-One, News Releases/TV/Radio, Participation in Events, Displays
- Deliver I Can Problem Solve and other possible curricula resources to communities including children, youth, parents/caretakers, teachers, agencies and service providers, schools, and out-of-school programs. •Provide training and other staff development opportunities to county educators •Create public awareness of programs and resources through promotional and educational materials to be distributed to teachers, agency professionals, and other community members.

2. Brief description of the target audience

Youth, children; parents; teachers; adult volunteers; middle to low income families; race and ethnicity will also be recognized as an identifier of audiences; caretakers, agencies & service providers, schools, policy makers; adults; small business owners

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	2000	150000	3000	2000
2008	149000	1444000	9300	49300

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	4	0	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Revised online curriculum

Year	Target	Actual
2008	1	1

Output #2

Output Measure

- Promotional materials and marketing campaign

Year	Target	Actual
2008	1	156

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Participants demonstrate improved food, nutrition, and/or physical activity behaviors
2	Participants plan to utilize recommended financial management practices
3	Participants plan to manage their use of credit and/or reduce debt
4	Participants will plan or revise an asset building strategy
5	Participants will utilize recommended financial management practices
6	Participants will manage their use of credit and reduce debt
7	Participants in asset building classes will have bought a home, started a savings account, started a retirement account, started a business, or made a positive change in their financial process
8	Number of teachers and child care providers learning interpersonal cognitive problem-solving techniques
9	Number of teachers and child care providers using interpersonal cognitive problem-solving techniques with children/youth
10	Number of children and youth using interpersonal cognitive problem-solving skills
11	Participants demonstrate improved food, nutrition, and/or physical activity behaviors.
12	Parent Child Connections - homes receiving Child Connection Services and Education

Outcome #1**1. Outcome Measures**

Participants demonstrate improved food, nutrition, and/or physical activity behaviors

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	240	3379

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Over the past decade, the percentage of those overweight has steadily increased in Oklahoma. As many as one in five Oklahoma children are at-risk of overweight or overweight; and two-thirds of adults are overweight or obese. Among children and adolescents, overweight increases the risk of type 2 diabetes, high blood pressure, and cardiovascular disease. The health of Oklahoma youth can be improved by increasing knowledge, skills, attitudes and behaviors related to food, physical activity and body image. Overweight, obesity and associated health problems have a significant economic impact. The estimated annual cost of overweight and obesity in the United States is \$117 billion. Just a 10% sustained weight loss has been estimated to reduce an overweight person's lifetime medical costs by \$2,200 to \$5,300.

What has been done

The OCES Healthy Oklahoma Impact Team (HOIT) educates Oklahoma youth on healthy food, nutrition and physical activity behaviors with the aim of reducing overweight and risk for related chronic disease. Efforts are conducted primarily in elementary classroom settings across the state. Topics include increasing consumption of breakfast, using nutrition facts labels to make healthy snack choices, making healthy choices when eating out, making healthy beverage choices, increasing intake of dairy foods, fruits and vegetables, and increasing time participating in physical activity. The lessons are aligned with the Oklahoma Priority Academic Student Skills (PASS) and are available on-line to food nutrition and health extension educators.

Results

In 2008, The Healthy Oklahoma Impact Team reached a total of 3,379 (10,166 total from 2005 to 2008) youth through school classroom nutrition education efforts. This is almost a 6% increase over the number of youth reached in 2007. Important improvements in food, nutrition and physical activity behaviors were observed among participating Oklahoman youth. The statistically significant observed improvements include:

- * Average of 20% improvement in 11 food and nutrition behaviors.
- * 30% improvement in each of 2 practices related to reading food labels.
- * 13% increase in each of 2 practices related to washing hands and eating.
- * 22% increase in time spent in physical activity.

These outcomes represent improved youth behaviors thereby reducing overweight and risk for related chronic disease.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
703	Nutrition Education and Behavior

Outcome #2**1. Outcome Measures**

Participants plan to utilize recommended financial management practices

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	200	3455

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

With low incomes relative to the U.S. as a whole, achieving and maintaining a desirable and sustainable quality of life in Oklahoma is difficult. Poverty rates exceed 11% of Oklahomans in general and reach as high as 21% or more for families with children under 5 and over 50% of those household when it is a female-headed household. And it is not only those individuals and household with children that face financial difficulties. Over 20% of households, age 65 or over, are living on less than \$17,000 per month. As with the rest of the nation, Oklahoma faces a shrinking middle class. It's citizens, youth included, face an ever increasing complex financial world with fewer and fewer tools available to handle the issues they face. The results are increases in bankruptcy filings, both personal and business, as well as the general feeling of financial insecurity--which may include inadequate planning for (and funding of) current and future income needs, inadequate insurance, excessive debt, and lack of wealth accumulation. These issues not only affect the welfare of the family, but the economic prosperity of the community and state as well.

What has been done

Cooperative Extension has implemented programs such as Dollar Decisions, Money Habitudes, High School Financial Planning Program, Teens and Money, Making Sense of Money management, and Managing Your Money in Challenging Times. All of these programs are designed to provide basic financial literacy training. Other programs have been offered such as Real World as well as business preparation and job readiness training that assist in helping individuals to increase their income stream.

Results

Approximately 40% of individuals say they intend to make changes to their financial management practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
602	Business Management, Finance, and Taxation

Outcome #3**1. Outcome Measures**

Participants plan to manage their use of credit and/or reduce debt

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	627

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma merchants lose millions of dollars each year as a result of bogus or insufficient fund checks. In 2007, the District Attorney's Office for District 6 of Oklahoma (Caddo, Grady, Jefferson and Stephens Counties) received 9,623 bogus checks. Because of Oklahoma Cooperative Extension's track record with Financial Management Education programs, a representative of the DA's office approached the FCS educator in Grady County about a partnership to provide financial management training for Bogus Check offenders.

What has been done

At the request of the District Attorney's office, a four-hour class was developed to provide individuals with the opportunity to improve their financial management skills and gain knowledge about financial opportunities. Objectives of the Making \$ense of Money Management program are: Help individuals develop their financial management skills, including: Maintain/balance a checking account; Develop and maintain a household financial management plan; and Build confidence in managing finances; and Decrease recidivism of Bogus Check offenders. Each district court has mandated that convicted bogus check writers attend the class.

Results

In 2008, five classes were held in Grady, Caddo and Stephens County with 53 participants completing the class. Comments from the end-of-class surveys show the program is changing attitudes:

'This class gave me hope. I can improve my situation.'

'I am going to encourage my teenage daughter to take this class. I didn't know how to help her with money questions.'

'My thoughts on saving money have changed - I'm gonna start a savings account.'

'I will write down all \$ transactions. I'm going to have a positive balance at the end of the month!'

Pre-test results

Behavior	Percentage	
Spend more than they would like		56.7%
Pay bills on time	81.1%	
Satisfaction with current financial situation		32.4%
Current Level of Financial Stress	Percentage	
Live from paycheck to paycheck	56.8%	
Could not find the money to pay for a financial emergency of \$1,000		72.6%
Goals for the next 12 months	Percentage	
Want to save for a specific goal	62.2%	
Save for an emergency fund	56.8%	
Reduce debt (goal ranged from \$150 to \$12,000)		64.8%

A relatively small number of participants (16.2%) indicated that their level of household debt had increased over the past 12 months. The increase ranged from \$165 to \$7,800.

Follow-up survey 3-6 months following class

Although the number of responses was small (n=7), the results were encouraging. Participants show an increase in their feeling of satisfaction (6 to 7.4) and a lowered level of stress (7.6 to 6.7). Three respondents indicated they have reduced household debt and one indicated an increase in household savings. In general, the participants indicated that the information they received in the class was helpful in contributing to their increase level of satisfaction.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
607	Consumer Economics

Outcome #4

1. Outcome Measures

Participants will plan or revise an asset building strategy

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	180	567

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With low incomes relative to the U.S. as a whole, achieving and maintaining a desirable and sustainable quality of life in Oklahoma is difficult. Poverty rates exceed 11% of Oklahomans in general and reach as high as 21% or more for families with children under 5 and over 50% of those household when it is a female-headed household. And it is not only those individuals and household with children that face financial difficulties. Over 20% of households, age 65 or over, are living on less than \$17,000 per month. As with the rest of the nation, Oklahoma faces a shrinking middle class. It's citizens, youth included, face an ever increasing complex financial world with fewer and fewer tools available to handle the issues they face. The results are increases in bankruptcy filings, both personal and business, as well as the general feeling of financial insecurity--which may include inadequate planning for (and funding of) current and future income needs, inadequate insurance, excessive debt, and lack of wealth accumulation. These issues not only affect the welfare of the family, but the economic prosperity of the community and state as well.

What has been done

Specific programs on Home-Buyer Education: Dallas Field Trip, and Food Business Basic Training along with other specific entrepreneurship and retirement programs have been offered alone or in partnership with other agencies.

Results

Based on earlier work, 62% of individuals think they will open their own business at some time in their lives. Nearly 90% anticipate owning their own home. And 75% anticipate a good retirement.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
602	Business Management, Finance, and Taxation

Outcome #5

1. Outcome Measures

Participants will utilize recommended financial management practices

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	242

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With low incomes relative to the U.S. as a whole, achieving and maintaining a desirable and sustainable quality of life in Oklahoma is difficult. Poverty rates exceed 11% of Oklahomans in general and reach as high as 21% or more for families with children under 5 and over 50% of those household when it is a female-headed household. And it is not only those individuals and household with children that face financial difficulties. Over 20% of households, age 65 or over, are living on less than \$17,000 per month. As with the rest of the nation, Oklahoma faces a shrinking middle class. It's citizens, youth included, face an ever increasing complex financial world with fewer and fewer tools available to handle the issues they face. The results are increases in bankruptcy filings, both personal and business, as well as the general feeling of financial insecurity--which may include inadequate planning for (and funding of) current and future income needs, inadequate insurance, excessive debt, and lack of wealth accumulation. These issues not only affect the welfare of the family, but the economic prosperity of the community and state as well.

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
607	Consumer Economics

Outcome #6

1. Outcome Measures

Participants will manage their use of credit and reduce debt

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	119

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With low incomes relative to the U.S. as a whole, achieving and maintaining a desirable and sustainable quality of life in Oklahoma is difficult. Poverty rates exceed 11% of Oklahomans in general and reach as high as 21% or more for families with children under 5 and over 50% of those household when it is a female-headed household. And it is not only those individuals and household with children that face financial difficulties. Over 20% of households, age 65 or over, are living on less than \$17,000 per month. As with the rest of the nation, Oklahoma faces a shrinking middle class. It's citizens, youth included, face an ever increasing complex financial world with fewer and fewer tools available to handle the issues they face. The results are increases in bankruptcy filings, both personal and business, as well as the general feeling of financial insecurity--which may include inadequate planning for (and funding of) current and future income needs, inadequate insurance, excessive debt, and lack of wealth accumulation. These issues not only affect the welfare of the family, but the economic prosperity of the community and state as well.

What has been done

Cooperative Extension, in addition to the general financial literacy programs listed earlier, has implemented a debtor's education program, Money Matters in Challenging Times, to support the financial educational needs of individuals filing bankruptcy. Some of the same participants reported under the first objective could also be listed in this section but was done to avoid double-counting. We also have provided general budgeting classes and workshops.

Results

Some 19% of individuals or an estimated 119 individuals, between the initial survey and later follow-up work, no longer carry credit card balances. Fifty percent of households indicated that their household debt levels have decreased and 14% have indicated that household savings have increased.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
602	Business Management, Finance, and Taxation

Outcome #7**1. Outcome Measures**

Participants in asset building classes will have bought a home, started a savings account, started a retirement account, started a business, or made a positive change in their financial process

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	11

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

With low incomes relative to the U.S. as a whole, achieving and maintaining a desirable and sustainable quality of life in Oklahoma is difficult. Poverty rates exceed 11% of Oklahomans in general and reach as high as 21% or more for families with children under 5 and over 50% of those household when it is a female-headed household. And it is not only those individuals and household with children that face financial difficulties. Over 20% of households, age 65 or over, are living on less than \$17,000 per month. As with the rest of the nation, Oklahoma faces a shrinking middle class. It's citizens, youth included, face an ever increasing complex financial world with fewer and fewer tools available to handle the issues they face. The results are increases in bankruptcy filings, both personal and business, as well as the general feeling of financial insecurity--which may include inadequate planning for (and funding of) current and future income needs, inadequate insurance, excessive debt, and lack of wealth accumulation. These issues not only affect the welfare of the family, but the economic prosperity of the community and state as well.

What has been done

Specific programs on Home-Buyer Education: Dallas Field Trip, and Food Business Basic Training along with other specific entrepreneurship and retirement programs have been offered alone or in partnership with other agencies.

Results

Based on earlier work, 2-5% of individuals will start their own business. This translates into an estimated 11 to 28 new businesses started.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development
607	Consumer Economics
602	Business Management, Finance, and Taxation

Outcome #8

1. Outcome Measures

Number of teachers and child care providers learning interpersonal cognitive problem-solving techniques

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	75	56

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

High risk behaviors in children and youth are serious concerns. In Oklahoma every year on average 6,000 youth under age 19 drop out of high school; 24,000 arrests involve children or adolescents; 2,300 babies are born to school-age teens; more teens engage in smoking, alcohol use, sexual activity, violence and weapon carrying than the national average (OK Institute for Child Advocacy; OK Youth Risk Behavior Survey). The many harmful or unhealthy risks encountered by families, children, and youth can impact long-term productivity, healthy functioning, and costs to communities and the state. Research has identified specific protective factors which have a positive influence on young people's lives however, the average youth experiences less than half of these critical assets (Search Institute).

What has been done

Beginning in 2007, the I Can Problem Solve program (ICPS; Shure, 2000) was chosen and implemented by the impact team. During 2008, Extension Educators in 18 counties recruited preschool or elementary school teachers with a class of children ages 4 through 8 and provided individual and/or group training and technical support on the ICPS program.

Results

Group in-service training evaluations completed by 24 participating teachers and child care providers indicated:

- * 50% rated their understanding of ICPS before training as 'poor' or 'fair' and 50% as 'good'. After training, 100% rated their understanding as 'good' or 'excellent'.
- * 96% reported the level their knowledge had increased was 'good' or 'excellent'.
- * 67% reported 'much' or 'very much' having changed practices and interactions with the children/class as a result of the program as well as learned techniques from the program useful for managing the class/group. Another 19% 'moderately' changed.
- * 86% rated the overall effect on their practices and interactions as 'somewhat good' or 'very positive'.
- * 90% rated their likelihood of using this program again in the future as 'somewhat good' or 'very positive'.
- * 62% rated the children in their classroom as 'much' or 'very much' using the skills learned through this program and 24% were 'moderately'. Also, 76% rated children were using the language of the program 'moderately', 'much', or 'very much'.
- * 86-93% rated the overall effect of this program on the children's behavior as well as the classroom/group atmosphere as 'somewhat good' or 'very positive'.

* 71-87% rated children in their classroom increased positive behaviors from before the program to after the program including: considerate and helpful to others, accepts responsibility for actions, cooperates and works well with others, expresses needs and feelings appropriately, thinks before acting, resolves peer problems on their own, and understands consequences of behavior. Also, 58-59% rated children decreased in verbal fights or provocation (uses put downs, name calling, teasing), and solving conflicts with hitting or pushing.

Impact evaluation questionnaires submitted by 21 teachers with classrooms receiving or utilizing ICPS indicated:

- * 67% 'much' or 'very much' learned techniques from the program useful for managing the class/group.
- * 71% 'much' or 'very much' increased knowledge or understanding as a result of the program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
806	Youth Development

Outcome #9

1. Outcome Measures

Number of teachers and child care providers using interpersonal cognitive problem-solving techniques with children/youth

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	60	52

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

High risk behaviors in children and youth are serious concerns. In Oklahoma every year on average 6,000 youth under age 19 drop out of high school; 24,000 arrests involve children or adolescents; 2,300 babies are born to school-age teens; more teens engage in smoking, alcohol use, sexual activity, violence and weapon carrying than the national average (OK Institute for Child Advocacy; OK Youth Risk Behavior Survey). The many harmful or unhealthy risks encountered by families, children, and youth can impact long-term productivity, healthy functioning, and costs to communities and the state. Research has identified specific protective factors which have a positive influence on young people's lives however, the average youth experiences less than half of these critical assets (Search Institute).

What has been done

During 2008, the I Can Problem Solve program was implemented in at least 28 preschool, Head Start, and elementary school sites. Trained teachers or other related staff utilized the ICPS program in their classrooms. Some county educators also co-facilitated or directly presented lessons to the children. Each class was to receive approximately 36 ICPS lessons over 10-12 weeks utilizing word concepts, stories, and group interaction to develop students' thinking skills with daily real-life problems such as generating alternative solutions, identifying consequences, and empathy. Teachers were trained to demonstrate and reinforce skills beyond the actual lessons using dialoguing techniques, integration with other classroom curricula, and supplementary activities.

Results

Impact evaluation questionnaires submitted by 21 teachers with classrooms receiving or utilizing ICPS indicated:

- * 67% reported 'much' or 'very much' having changed practices and interactions with the children/class as a result of the program and another 19% have 'moderately' changed.
- * 76% reported 'much' or 'very much' using the skills learned through this program.
- * 86% rated the overall effect of this program on the teacher's practices and interactions as 'somewhat good' or 'very positive'.
- * 90% rated the likelihood of using this program again in the future as 'somewhat good' or 'very positive'.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development
802	Human Development and Family Well-Being

Outcome #10

1. Outcome Measures

Number of children and youth using interpersonal cognitive problem-solving skills

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1000	700

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

High risk behaviors in children and youth are serious concerns. In Oklahoma every year on average 6,000 youth under age 19 drop out of high school; 24,000 arrests involve children or adolescents; 2,300 babies are born to school-age teens; more teens engage in smoking, alcohol use, sexual activity, violence and weapon carrying than the national average (OK Institute for Child Advocacy; OK Youth Risk Behavior Survey). The many harmful or unhealthy risks encountered by families, children, and youth can impact long-term productivity, healthy functioning, and costs to communities and the state. Research has identified specific protective factors which have a positive influence on young people's lives however, the average youth experiences less than half of these critical assets (Search Institute).

What has been done

Trained teachers, child care providers, and counselors utilized the ICPS program in preschool centers, Head Start centers, and elementary schools reaching 62 classrooms of children pre-Kindergarten through 2nd grade. Some county educators also co-facilitated or directly presented some of the lessons to children in the classrooms.

Results

Impact evaluation questionnaires submitted by 21 teachers with classrooms receiving or utilizing ICPS indicated:

- * 62% of the children are 'much' or 'very much' using the skills learned through this program and another 24% are 'moderately'.
- * 76% are using the language of the program 'moderately', 'much', or 'very much'.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development
802	Human Development and Family Well-Being

Outcome #11

1. Outcome Measures

Participants demonstrate improved food, nutrition, and/or physical activity behaviors.

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over the past decade, the percentage of those overweight has steadily increased in Oklahoma. As many as one in five Oklahoma children are at-risk of overweight or overweight; and two-thirds of adults are overweight or obese. Among children and adolescents, overweight increases the risk of type 2 diabetes, high blood pressure, and cardiovascular disease. The health of Oklahoma youth can be improved by increasing knowledge, skills, attitudes and behaviors related to food, physical activity and body image. Overweight, obesity and associated health problems have a significant economic impact. The estimated annual cost of overweight and obesity in the United States is \$117 billion. Just a 10% sustained weight loss has been estimated to reduce an overweight person's lifetime medical costs by \$2,200 to \$5,300.

What has been done

OCES programs targeting youth populations have joined efforts with State agencies and agricultural commodity organizations to develop an interactive educational exhibit to link the relationship between agriculture as the source of nutrient dense foods and role of these foods to health. The collaborating programs and agencies include OCES HOIT, OCES Community Nutrition Education Program (CNEP), OCES 4-H, OCES Ag in the Classroom, Oklahoma State Department of Health WIC Service, and Southwest Dairy Farmers. Exhibit messages are consistent with and enhance the HOIP and CNEP youth program messages, are research based and consistent with United States Department of Agriculture (USDA) Dietary Guidelines for Americans 2005 and MyPyramid.

Results

The Farm to You exhibit began traveling to county sites in September 2008. As of March 1, 2009, 8,800 students had experienced the exhibit at over 24 sites representing multiple schools. Three marketing events were conducted, increasing the awareness of parents, school personnel and community members on the importance of teaching the link between agriculture and health. Beginning January 2009 these efforts will be further enhanced through distribution of family newsletters aimed at extending exhibit messages into the home. Evaluation of the exhibit's impact on student knowledge and behaviors will be completed in July 2009.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
703	Nutrition Education and Behavior
806	Youth Development

Outcome #12

1. Outcome Measures

Parent Child Connections - homes receiving Child Connection Services and Education

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	211

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

On average each year in Oklahoma, more than 13,000 incidents of child abuse and neglect are confirmed. Over half of these children are under age six. About 40 children die due to maltreatment annually, over 70% of which did not live to age two. The majority (85%) of abuse and neglect occurs in the hands of a child's own parents. Neglect is most prevalent, indicated in 85% of the confirmed cases. The most active and significantly influenced brain development period is birth to age 3. Research indicates that home visitation and parenting education and support services around the time of a baby's birth through early childhood reduces the risk of child abuse, and contributes to positive, healthy childrearing practices and family functioning.

What has been done

OCES implemented parent education home visitation programs in 1991. Currently, four OCES Parent Child Connections programs serve seven counties: Canadian, Delaware, Texas and Southwest (Cotton, Jefferson, Comanche, and Stephens). Families are enrolled during pregnancy until 12 months after their baby's birth, and may continue the program until the child is age six. Participation is voluntary. Services include home visitation, center-based education and support, screening and assessment, and referrals to health care providers and other community resources.

In FY 2008, 211 families were provided 2,453 home visits and 564 child development screenings. In addition, numerous parent education, support group, and family activity sessions were conducted. One-half to 2/3 of the enrolled parents were single or divorced and 35% were under age 20. Primary funding for the programs is from state legislative appropriations through the Oklahoma State Department of Health, Child Abuse Prevention Fund. FY 2008 contract awards to OCES amounted to \$588,765. Collaboration with a variety of local community organizations is emphasized to garner additional program support, better utilize scarce resources, and provide a comprehensive array of services to effectively meet families' needs.

Results

Based on a statewide evaluation of 22 programs (Oklahoma State Department of Health, 2007), 95% of children were up-to-date on their immunizations according to parent self-report compared to the Oklahoma state rate of 83%. Participant surveys indicate nearly 90% said it was 'very true' that they felt better prepared to care for their children, and that the health and well-being of their children was improved. Previous evaluations of the OCES parent education/home visitation programs suggest that first-time mothers experienced significant improvement in infant development knowledge, understanding of empathic responsiveness and child and parent roles in the family, home safety, and involvement in community agencies (i.e., Culp, Culp, Blankemeyer, & Passmark, 1998).

Rigorous cross-sectional, comparison, and randomized control trial studies of similar programs in other states have reported significant, positive outcomes for families receiving services as compared to families not in the program, the county, community, or state as a whole. The outcomes include lower rates of child maltreatment, less physical and psychological abuse, fewer children hospitalized for child maltreatment, higher rates of linkages to a medical care provider and immunizations, fewer emergency room visits, higher birth weights, more responsive and developmentally stimulating home environments, greater parent-child interaction, increased child development and care knowledge, delayed subsequent pregnancies, improved educational and employment conditions, and lower dependence on public assistance (Healthy Families America, 2002, 2008). Prevent Child Abuse America (2007) estimated the annual cost of child abuse and neglect in the U.S. at \$103.8 billion including direct costs (i.e., hospitalization, mental health care, child welfare services, law enforcement) and indirect costs (i.e., special education, juvenile delinquency, mental health and health care, the adult criminal justice system, and lost productivity to society). Research suggests that prevention programs can reduce these expenses to our society as well as the non-monetary negative impacts on children, families, and communities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

V(H). Planned Program (External Factors)**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (community/school support access)

Brief Explanation

2008 saw the beginning of a serious economic downturn in the United States. While the OK economy weathered the initial phases in better shape than other parts of the country, those factors are now showing up in an OK slowdown. This has increased the interest in several of our financial management programs as well as our general press releases. However, it also impacts the ability for many families to take many financial steps forward as they now struggle just to remain in place.

Another finding just beginning to show up on our surveys is the fact that once a person gains more financial knowledge they seem to become less satisfied and more depressed regarding their current financial situation. When this is linked to the general economic picture, we are today working with clients that are more and more stressed about the future.

For financial literacy for youth, a regulatory change requiring financial literacy education has substantially increased the orders and numbers of participants in the *High School Financial Planning Curriculum*.

Finally, the Federal Law change regarding the need for debtor education before completing bankruptcy proceedings continues to create opportunities and challenges. Some of our competitors are offering both the required debtor counseling and debtor education for a single price. Other agencies are offering on-line training again diluting our potential pool. OCES is currently the only service doing debtor education for the entire state on a face-to-face basis.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- During (during program)

Evaluation Results

I Can Problem Solve

A quasi-experimental control group design study was conducted with teachers ($n = 30$) and preschool through 2nd grade children ($n = 305$) participating in the impact team's initial implementation of the *I Can Problem Solve* (ICPS) program in 2007 through early 2008. Teacher ratings of children in classrooms using the ICPS program indicate significant positive changes in their behavior from pre-test to post-test when compared to peers in classrooms not receiving ICPS, specifically social competence, $F(1, 299) = 34.54, p < .001$; aggression $F(1, 303) = 15.35, p < .001$; prosocial skills, $F(1, 299) = 27.41, p < .001$; emotional regulation, $F(1, 299) = 39.70, p < .001$; and, academic skills, $F(1, 299) = 21.02, p < .001$. Some positive changes in social cognitive problem-solving skills were also found to be significant for the intervention group compared to the control group ($n = 282$), specifically the number of different initial solutions, $F(1, 210) = 7.50, p < .01$, and ratio of relevant initial solutions, $F(1, 210) = 6.42, p < .01$, the children gave to hypothetical problem situations. These findings pertained to children K-2nd grade after removing preschoolers from the analyses.

Impact evaluation questionnaires submitted by 21 teachers with classrooms receiving or utilizing ICPS in 2008 indicated:

- 74% rated the overall effect of this program on the children's social and emotional development as "somewhat good" or "very positive".
- 86% rated the overall effect of this program on the children's behavior as "somewhat good" or "very positive".
- 86% rated the overall effect of this program on the classroom/group atmosphere as "somewhat good" or "very positive".
- 71-87% rated children in their classroom increased the following positive behaviors from prior to the program to after the program: considerate and helpful to others, accepts responsibility for actions, cooperates and works well with others, expresses needs and feelings appropriately, thinks before acting, resolves peer problems on their own, and understands consequences of behavior. Also, 58-59% decreased in the following behaviors: verbally fights or provokes (uses put downs, name calling, teasing), and solves conflicts with hitting or pushing.

Key Items of Evaluation

I Can Problem Solve

In 2007 through early 2008, the following measures and procedures for both the intervention and control teachers and classes were utilized. Data was collected only on individual children for whom parent/guardian consent was received.

ect; *Child Interviews* - OCES county educators met individually with each participating student twice, before and after the presentation of the ICPS program lessons. A series of ten scenarios and questions were provided for the OCES educators to use along with guidelines on conducting the interviews. Each item presents a hypothetical story or scenario of a problem will be read to the child. The child was asked how the characters in the story, or themselves, might handle the situation, ideas for solving the problem, or feelings they may have. The children were prompted to provide as many different solutions as possible, up to four, which were documented in writing.

ect; *Teacher Ratings of Child Behavior*– Participating teachers were asked to complete a questionnaire pre- and post-program for each participating child in their classroom. The instrument is composed of 37 brief statements for which the teacher rates each item using a Likert scale.

ect; *Program Process and Quality* – Three questionnaires assessed the use of the curriculum, program implementation, fidelity, and satisfaction completed by both the teachers and county educators. These measures were not collected from the control classes since did not receive the ICPS program intervention.

In 2008, an *Impact Evaluation Questionnaire* and *In-service Training Evaluation* were developed and collected from teachers after training or program delivery. Some questions utilized a retrospective pre/post approach.

Program #8

V(A). Planned Program (Summary)

1. Name of the Planned Program

4-H Youth Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	5%		0%	
806	Youth Development	95%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	34.5	0.0	0.0	0.0
Actual	102.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1775000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1775000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
9995187	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The 4-Youth Development program is a broadbased program to improve life skills of youth in Oklahoma. Activities vary widely and include: after-school, community development, natural resources, livestock and companion animals, health and wellness, citizenship, science, computers, camping, recreation, shooting sports, public speaking and many more. This report only highlights a few more recently developed projects. Those include the following.

Create a pilot-tested, web-based project curriculum which will be widely used in county extension programs. This curriculum will be designed to introduce students to precision agriculture and geospatial technology.

Start precision agriculture and geospatial 4-H project clubs by training 4-H volunteers and teen leaders to utilize the new materials to start precision agriculture project clubs.

Incorporate the precision agriculture curriculum into the Oklahoma Ag in the Classroom program. This curriculum will cover geospatial technologies and agricultural topics such as GPS/GIS, robotics, remote sensing, and precision agriculture.

Train Educators and county teams to develop Environmental Stewardship teams with emphasis on water, watersheds, streambank restoration, waste management, recycling, etc..

Recruit Volunteers interested and committed to the concept of developing strong Youth-Adult Partnerships for the benefit of serving the community and provide training and materials for initiating and maintaining teams of youth and adults committed to serving the community.

Involve community leaders and other youth serving agencies as instructors/resources during the training process.

And continue to conduct the high impact projects and programs for youth in addition to these of more recent emphasis.

2. Brief description of the target audience

Youth (grades 6-8) in 10 pilot counties will test new agricultural technology curriculum.

Youth and adult leaders in 16 counties will conduct environmental impact programming to other 4-H youth and the public.

Youth and adult 4-H mentors and/or other youth serving agencies, and teens, as well as volunteers recruited to work with underserved audiences.

Youth projects in a wide array of topics conducted.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	52	150	550	1000
2008	20500	150000	430000	6000000

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	3	0	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Web-based pilot curriculum - lessons developed and tested

Year	Target	Actual
2008	10	10

Output #2

Output Measure

- New Geospatial 4-H project clubs with an emphasis on precision agriculture

Year	Target	Actual
2008	5	4

Output #3

Output Measure

- Youth-adult environmental education teams

Year	Target	Actual
2008	150	24

Output #4

Output Measure

- Teams of youth and adults interested in and committed to developing strong youth-adult partnerships for serving the community

Year	Target	Actual
2008	52	79

Output #5

Output Measure

- Groups subsequently assisted and trained by "graduating" classes of youth community leadership.

Year	Target	Actual
2008	10	1

Output #6

Output Measure

- Number of youth participating in Outdoor Recreation and Natural Resources Projects

Year	Target	Actual
2008	{No Data Entered}	17266

Output #7

Output Measure

- Number of youth participating in Youth Livestock Projects.

Year	Target	Actual
2008	{No Data Entered}	30500

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Participants interested in pursuing a career in geospatial and precision technologies fields
2	Number of well-water assessments conducted
3	Number of well owners beginning voluntary well water testing for bacteria
4	Number of youth/adults that continue volunteer well-water testing and other environmental monitoring past training
5	Number of community leadership action plans completed
6	Number of trained and "graduated" youth and adult volunteers still providing direction tho their communities in elected and/or volunteer roles

Outcome #1

1. Outcome Measures

Participants interested in pursuing a career in geospatial and precision technologies fields
Not reporting on this Outcome for this Annual Report

Outcome #2

1. Outcome Measures

Number of well-water assessments conducted
Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

Number of well owners beginning voluntary well water testing for bacteria
Not reporting on this Outcome for this Annual Report

Outcome #4

1. Outcome Measures

Number of youth/adults that continue volunteer well-water testing and other environmental monitoring past training
Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures

Number of community leadership action plans completed

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	52	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rural communities need willing, experienced leaders and a broad involvement of their citizens. The Oklahoma Leadership and Community Volunteer Development Teams program is designed to help youth and adults in rural communities improve their abilities to work in partnership to address community needs.

What has been done

Sixteen counties have trained 79 teams - composed of 1,145 youth and 498 adult mentors. Teams received six-hundred and ninety hours of training for the purpose of developing and carrying out Community Plans of Action.

Results

Twelve action plans were completed. Action Plan Highlights include:

Bryan County - Community teams focused on Underage Drinking by planning and conducting two alcohol-free community activities targeted at teens - Battle of the Bands and the Chili Challenge. One-hundred and thirty youth and community leaders attended.

Creek County -Due to drought, fires, and ice storms the teams chose to focus on debris clean-up, refurbishing six flower beds and replanting 50 trees in six communities. Nineteen youth and eight adult volunteers invested \$56,000 dollars worth of time in Creek County as a result of this team activity.

Caddo County - The 'Youth/Adult Task Force' was formed as a result of an alliance with the Caddo County Interagency coalition and the Kiowa Injury Prevention 'Suicide Prevention' Grant. The Task Force conducted the 'Journey of Success' teen lock-in which focused on tobacco use, abstinence abuse, coping skills and underage drinking.

Pittsburg County - The Community Development team coordinated an Adolescent Health Conference that reached 450 teens.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
806	Youth Development

Outcome #6

1. Outcome Measures

Number of trained and "graduated" youth and adult volunteers still providing direction tho their communities in elected and/or volunteer roles

Not reporting on this Outcome for this Annual Report

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Programmatic Challenges
- Populations changes (immigration,new cultural groupings,etc.)

Brief Explanation

Original teams found water well testing to not be a successful emphasis for environmental projects and this effort was discontinued.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.

Evaluation Results

Key Items of Evaluation

Program #9

V(A). Planned Program (Summary)

1. Name of the Planned Program

Turfgrass Development and Management

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	11%		10%	
201	Plant Genome, Genetics, and Genetic Mechanisms	1%		5%	
202	Plant Genetic Resources	8%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	3%		10%	
204	Plant Product Quality and Utility (Preharvest)	9%		5%	
205	Plant Management Systems	20%		15%	
206	Basic Plant Biology	1%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	7%		10%	
212	Pathogens and Nematodes Affecting Plants	20%		10%	
216	Integrated Pest Management Systems	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	1.6	0.0	2.7	0.0
Actual	2.0	0.0	0.7	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
99000	0	60229	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
99000	0	60229	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
184801	0	486842	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

New turf germplasm/varieties will be generated by our program. These products will have improved abiotic and biotic stress resistance/tolerance. Research will identify the elite performing varieties from both our program and from industry. Research will identify new or refined integrated management practices. Educational materials will be developed featuring improved varieties and how to properly maintain them. Intense and effective educational programming will be conducted to help integrate this information into existing management programs. Rational decision making based on the combination of science, perception and sound public policy will be made by the turf industry and the public at large. Resultant adoption of integrated turfgrass management strategies will occur and turfgrass performance can be maintained or improved with reduced potential negative environmental impacts.

2. Brief description of the target audience

Audiences include governmental, private industry and multiple end-user areas. Research audiences: basic and applied plant science/turf science researchers, including those from the CSSA, and ASHS. Funding agency audiences: USGA, GCSAA, USDA, OTRF and many private corporations. New cultivars developed as well as products such as trade articles, fact sheets, and educational programming will be provided to the target audiences characterized as the turfgrass production sector (sod and seed producers), service sector (landscape/lawn care and pest control operators) and turf managers (which include the golf course, parks & grounds, right of way managers and home consumers).

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	2000	10000	0	0
2008	19375	2300	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	3	3	6

V(F). State Defined Outputs

Output Target

Output #1**Output Measure**

- Number of peer-reviewed journal articles manuscripts submitted

Year	Target	Actual
2008	2	1

Output #2**Output Measure**

- Number of final stage experimental bermudagrasses sent to national testing phase in the NTEP bermudagrass trial

Year	Target	Actual
2008	0	0

Output #3**Output Measure**

- Number of turf/roadside vegetation management workshops conducted

Year	Target	Actual
2008	15	21

Output #4**Output Measure**

- Number of turfgrass managers trained in improved varieties and integrated turfgrass management systems

Year	Target	Actual
2008	500	1302

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	New varieties appearing in the Oklahoma sod trade for the first time
2	New turf varieties used by the Oklahoma golf course industry
3	Number of turfgrass manager participants intending to adopt improved turf management practices

Outcome #1**1. Outcome Measures**

New varieties appearing in the Oklahoma sod trade for the first time

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	2

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Oklahoma has a vibrant turfgrass production and management industry. Turfgrass sod is produced on an estimated 12,000 acres in Oklahoma and has a total annual output impact of over \$76 million per year. Oklahoma's sod production industry is estimated to be in the top ten for economic impact in the U.S. Favorable production conditions as well as proximity to growing urban areas and suitable interstate transportation system all support the industry. Although a small portion of the total turfgrass sod production industry in Oklahoma, tall fescue and Kentucky bluegrass sod sales are significant. As urban landscapes mature, a larger percentage of the lawn is enveloped in shade; wind speed is reduced leading to more disease potential and tree root competition for moisture increases during drought. Annual reseeding of cool-season grass lawns is a regular practice due to stand loss in summer. Use of tall fescue/Kentucky bluegrass mixes with improved overall summer stress tolerance will improve the visual quality of shaded lawns, reduce the need for annual reseeding and reduce expenditures on fungicides for brown patch disease control.

What has been done

Continuous testing has been performed in Oklahoma through the National Turfgrass Evaluation Program and industry funded trials to evaluate the overall adaptation of several hundred tall fescue and Kentucky bluegrass cultivars over the last two decades. While little improvement in summer performance has been documented with tall fescue, substantial improvements in summer performance of Kentucky bluegrasses has occurred during this time period. Generally, varieties of Kentucky bluegrass with improved tolerance to Summer Patch disease show better stand persistence. Still, only a handful of Kentucky bluegrasses show marked improvement in summer stress tolerance. These improved Kentucky bluegrasses are available for bulk purchase over the internet and have in recent years become available for purchase locally in mixes with tall fescue from local garden centers. In 2008, an additional sod producer implemented mixing of tall fescue with designated improved Kentucky bluegrass cultivars. Although only a single sod producer it is important to note that an individual sod farm serves hundreds of lawns in the state. Regular communications with regional seed distributors has also insured the use regionally adapted varieties in seed mixes for those preferring to seed cool-season lawns.

Results

Oklahoma home owner and professionals alike have an increased opportunity to purchase sod containing improved Kentucky bluegrasses as a component of their cool-season grass mix for use in shaded areas. Use of varieties with improved adaptation will decrease their annual expenditures for cool-season grass used to reseed damaged areas, reduce fungicide use for brown patch disease control and improve the aesthetic quality and value of shaded cool-season lawns.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #2

1. Outcome Measures

New turf varieties used by the Oklahoma golf course industry

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	1

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Golf is an enjoyable recreational past time practiced by thousands of Oklahomans. Additionally, Oklahoma Golf courses provide \$132 million in economic output impacts each year, providing an additional \$81 million in value added impact, and providing 3,100 jobs and \$49 million in payroll. The turfgrass industry remains under intensive scrutiny to reduce labor, pesticide, fertilizer and other cultural inputs while providing cost effective product production, or in the case of maintained turf, soil erosion control with high visual or functional quality.

What has been done

We have tested some 1,403 commercially available and 3,243 experimental turfgrass varieties across 21 species for adaptation to lawn, roadside, parks & grounds, golf course and sod production applications in OK during the last 19 years. Research continued in 2008 regarding testing of bermudagrasses, Kentucky bluegrasses and creeping bentgrasses as well as the proper management for their particular turfgrass industry niche. A five year long project testing a rapid in-field sod commercial quality scoring system was completed. The technique allows for a single evaluator to rapidly screen sod pad handling characteristics. This technique is valuable in turfgrass breeding/development programs as well as for sod farmers performing on-farm cultivar evaluations. Sod handling quality has a major influence on the sod production industry's receptivity of new varietal offerings. Even excellent adapted varieties are not accepted by the sod industry if they have poor sod tensile strength.

Results

Research results from cultivar evaluation trials are used directly by the turfgrass specialist or end user when making recommendations concerning turfgrass selection for a given site. During new construction and renovation of speciality turf areas such as golf courses and athletic fields, better-adapted turfgrass varieties are being utilized in over 85% of cases in Oklahoma. Fungicide use for dollarspot disease control has been reduced by at least 10% (2 applications) when L-93, A-1, A-4 and G-2 creeping bentgrasses have been implemented on golf course putting greens in Oklahoma. This has resulted in an estimated savings of \$75,000 per year total on all Oklahoma Golf Courses. Patriot hybrid bermudagrass and Riviera seeded bermudagrass, both improved OSU releases, continued to be installed on high school, college and professional NFL practice facilities and stadiums in the U.S. during 2008. For golf courses that treat with fungicides for spring dead spot disease, a 30 acre fairway facility would save a minimum of \$4,000 in fungicide use per year per facility by using an improved OSU bermudagrass variety as compared to an older susceptible variety acquiring the disease and requiring treatment. Sod producers utilizing a licensed OSU improved bermudagrass variety could expect to experience an additional minimum of \$13,500 in profits per year (after all additional costs are accounted for over and above public domain bermudagrass production) in a scenario of 30 acres of proprietary variety production/sales per year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
202	Plant Genetic Resources
205	Plant Management Systems
111	Conservation and Efficient Use of Water

Outcome #3

1. Outcome Measures

Number of turfgrass manager participants intending to adopt improved turf management practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	400	1080

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has a vibrant professional turfgrass industry serving the golf course, lawn care, parks/grounds, sports field and right of way turfgrass areas. Turfgrass sod is produced on an estimated 12,000 acres in Oklahoma with a total annual economic impact of over \$76 million per year. Over 1.2 million lawns are present in the state with lawn service economic impact of over \$107 million per year. Oklahoma Golf courses provide \$132 million in output impacts each year, providing an additional \$81 million in value added impact, and providing 3,100 jobs and \$49 million in payroll each year.

Turfgrass management is a profession, with the use of state of the art management practices necessary to provide high quality turf, whether for aesthetic or utilitarian purposes. Integrated Turfgrass Management involves a comprehensive program of proper turfgrass selection, establishment and maintenance coupled with pest management based on Integrated Pest Management. The turfgrass management industry is under increased scrutiny to provide consistent turfgrass performance with more cost effective and sustainable management practices having minimal effect on the environment.

What has been done

The Turfgrass Management/Science Team at Oklahoma State University trained over 1300 turfgrass management professionals in 23 workshops in 2008. Training covered aspects of proper turfgrass selection, establishment, fertilization, irrigation, mowing, weed, insect and disease control. A Poster, Publication L-327: Common Diseases of Turfgrass in Oklahoma was developed and distributed to attendees at three conferences in Oklahoma. The poster provided high impact identification of the most significant diseases of the main turfgrasses utilized in the state.

Results

The training session increased the knowledge base and professionalisms of turfgrass professionals in Oklahoma. Improved decision making skills will result in turf managers being more effective and efficient at their job in the future. Turf managers report that they feel the added expertise results in their being able to manage turf in an environmentally conscience manor. Improved efficiency will result in a financial savings and increased profitability to landscape/lawn care companies. Park districts, municipal golf courses and right of way managers will be able to use tax payer appropriations more cost effectively. Training sessions stimulate increased interest in attendees participating in educational opportunities in the future.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
111	Conservation and Efficient Use of Water

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Economic Climate:

Due to an economic down turn in the economy, golf course construction in Oklahoma and nationally has slowed and fewer Seed Production companies nationally are submitting new turfgrass varieties for testing through the National Turfgrass Evaluation Program (NTEP). Additionally, the Golf Course Superintendents Association of America (GCSAA) and the United States Golf Association (USGA) while having held a call for research proposals in 2008, subsequently froze their awarding process before the end of the year. We were not awarded three highly anticipated cultivar evaluation trials in 2008, resulting in a reduction in anticipated revenues by \$6,000 per year for the next five years (totaling a multi-year loss of \$30,000). Furthermore, we were notified that we would be awarded our anticipated 2009 USGA Bermudagrass Breeding and Development grant in 2010, a one year delay, due to financial conditions of the USGA. This set back will result in the loss of an additional \$25,000 in grass development funding for the combined Horticulture/LA Dept and Plant & Soil Science Departments in 2009. Royalties returned to DASNR on commercialized turfgrass products are down because total sod sales of Patriot hybrid bermudagrass are down during this economic downturn. While we did not apply for GCSAA funding, their application process was frozen without any comment on proposals in 2008.

Risk Mitigation Strategy Utilized by Tall fescue Blend Sod Producers:

We have witnessed three cases where sod producers have chosen to not reveal the tall fescue varieties used in their tall fescue sod blends being sold commercially. By stating that they are selling a variety not stated (VNS) blend, sod producers are not required by law to list the specific varieties present in their tall fescue sod. Consequently, this unwillingness to disclose varieties being utilized has greatly reduced our ability to assess the impact of our research screening of new tall fescue varieties for improved performance as well as the adoption of the extension information we provide in our workshops. Sod producers have become reluctant to share the names of varieties used in their blends because of two factors. First, concern by the producer that a competitor may learn about which varieties the producer is finding most successful in the production of a sod blend and secondly, a concern that by listing varieties utilized when not required by law, the producer exposes the sale of their product to risk when consumers shop for name-sake varieties and the producer does not have the specific variety present in their sod blend. The tall fescue variety market is very volatile with a number of varieties entering and leaving the supply side of the chain each year. It is understandable that sod producers have unfortunately chosen the strategy of not revealing their varieties used in sod blends as a hedge against potential loss in sales of tall fescue product for the reasons stated above.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

Evaluation Results

Post Program Survey:

Forty-eight participants in the 2008 Annual Oklahoma/Arkansas Turfgrass Short Course were surveyed at the close of the 2 day short course held at Stillwater, OK. Seventy-one percent of participants completed the survey. All participants that took the short course were already employed professionally in the Oklahoma and Arkansas turfgrass management industry. Respondents were from the lawn care, parks/grounds, and golf course industries. The quality of the turf short course and the facilities used scored a 4.7 and 4.3 respectively, where 5= excellent and 1=poor. Ninety-seven percent of survey respondents stated that they could recommend the short course to other professionals and that the course would result in them being more effective and efficient at their job in the future. Ninety-four percent of respondents felt that after having completed the course they could manage turf in a more environmentally conscience manor with six percent stating they were uncertain. Seventy percent of respondents felt that implementing the information presented would result in a financial savings to their company with nine percent indicating it would not and nine percent indicating they were uncertain. Eighty-eight percent of respondents stated that they would attend an advanced turfgrass short course if one were offered in the future.

Key Items of Evaluation

Program #10**V(A). Planned Program (Summary)****1. Name of the Planned Program**

Community Resource and Economic Development

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	50%		0%	
805	Community Institutions, Health, and Social Services	50%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	12.9	0.0	0.8	0.0
Actual	17.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
379000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
379000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1595100	0	0	0

V(D). Planned Program (Activity)**1. Brief description of the Activity**

Strategic planning training and strategic planning for communities, infrastructure planning, community service plans, medical facilities and services planning, training of county elected officials, engineering and manufacturing consulting, community economic development studies, community leadership and agricultural leadership development, and entrepreneurship training and development.

2. Brief description of the target audience

The target audience includes community leaders (volunteer and elected), agricultural leadership participants and alums, and business owners/prospective owners, manufactureres, hospitals, schools, chambers of commerce, other agencies

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	890	10650	0	0
2008	48295	156500	8700	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	3	4	7

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of community services plans completed

Year	Target	Actual
2008	10	52

Output #2

Output Measure

- Number of education modules completed

Year	Target	Actual
2008	1	27

Output #3

Output Measure

- Number of county officer training courses conducted

Year	Target	Actual
2008	35	84

Output #4

Output Measure

- Number of manufacturing firms receiving applications engineering assistance

Year	Target	Actual
2008	50	222

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Number improving business skills
2	Number of manufacturing jobs created or retained
3	Number of communities where capacity was increased
4	Number of participants that plan to open/expand a business
5	Number of communities that build plans for growth and/or improvement
6	Number of leadership class graduates actively participating in community or industry

Outcome #1**1. Outcome Measures**

Number improving business skills

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	150	2451

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Small businesses and entrepreneurship are considered the driving force of economic growth. With the current economic situation and Oklahoma's low ranking in statistics such as per capita income and the number of people at or below poverty, it is important that everything possible be done to expand our development and growth of these individuals.

What has been done

Since 1985, OCES has recognized the growing trend of entrepreneurship, and has promoted this activity by providing a wide variety of help. Through the statewide network of Extension Educators, OCES provides workshops, written materials, news articles and personal assistance to help a business owner get started, survive and grow. In particular, help with networking and marketing are of vast importance to small business owners, and hands-on workshops and written materials emphasize this topic. Specific materials for specific needs are available, and numerous workshops have been developed on a wide variety of topics. One-on-one assistance is offered and often provided to small business owners looking for help getting started or growing.

Results

On average, 5 - 10% of individuals attending a workshop intend to open a small business. Based on a 2006 Oklahoma survey finding that the average gross income for new businesses was approximately \$40,000, this added approximately \$1,500,000 to Oklahoma's economy. Of those already in business, about 80% are still in business some 4 years later in comparison to 40-60% typically remaining in business as identified by the US Small Business Administration. Both the new businesses started and the additional businesses retained contribute to long-term development goals and job growth within the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #2**1. Outcome Measures**

Number of manufacturing jobs created or retained

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	50	265

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Of the over 5000 manufacturers in Oklahoma, approximately half are located in rural areas and are extremely important to their local economies. The loss or downsizing of even one of these wealth-generating small or mid-sized companies can have devastating consequences for the host and surrounding communities. These rural firms face particular difficulty in getting relevant and usable information and technical assistance that will keep them abreast of the rapid changes in manufacturing technology.

What has been done

Applications Engineers have been deployed in the state in collaboration with the Oklahoma Cooperative Extension Service and the Oklahoma Manufacturing Alliance to provide on-site engineering assistance. In order to receive engineering assistance the client must agree to a post-project impact assessment. This impact assessment is done using procedures developed by the National Institute for Standards and Technology for the Manufacturing Extension Partnership.

Results

The impact of this program is measured in several ways. One is the economic value of the service to the company as reported by the client. Another measure is the number of jobs created or retained. Both impacts are measured by an independent survey of the client. Number of jobs created or retained is translated into economic impact using an income multiplier to compute the direct, indirect, and induced effects due to a change in the number of jobs in the manufacturing sector.

The multiplier was developed from data collected from two different sources. First, the average salary for manufacturing in Oklahoma (\$34,323) was taken from the U.S. Bureau of Labor Statistics published information for 2001. Secondly, the income multiplier of 2.2 was obtained from IMPLAN data for Oklahoma. The total economic impact can be computed by multiplying the average annual salary times the income multiplier to arrive at \$75,511 for each new or retained job in the manufacturing sector.

In 2008, the Applications Engineers client projects had the following impacts:

Sales increase	\$21,882,099	
Sales retained that would have otherwise been lost		\$ 7,857,392
Cost savings	\$5,336,513	
Costs avoided	\$5,513,808	
185 new jobs created at \$75,511 per job		\$13,969,535
80 jobs retained at \$75,511 per job		\$6,040,880
0 jobs lost at \$75,511 per job		-\$0
Investment in new plant facilities and equipment		\$16,701,732
Total impact	\$77,301,959	

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

Number of communities where capacity was increased

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10	36

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)****What has been done****Results****4. Associated Knowledge Areas**

KA Code	Knowledge Area
608	Community Resource Planning and Development
805	Community Institutions, Health, and Social Services

Outcome #4**1. Outcome Measures**

Number of participants that plan to open/expand a business

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	70

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Small businesses in rural areas tend to struggle to establish a market presence and compete in today's economy.

What has been done

During 2008, the Oklahoma State University e-commerce program provided training to over 160 small businesses on how to plan, effectively set up, and promote their websites, which can help address these issues. Prior to the training, 46% indicated that they already had a website. 83% of the respondents indicated that the website planning was 'very useful' for their business, while 87% found the information on website promotion 'very useful.' After the training, 91% of respondents planned on either developing a website or altering their current site.

Results

These full-day, hands-on sessions are positively impacting rural businesses as evidenced by success stories of former attendees. These include those who have developed websites to promote their business (such as the jewelry maker in Poteau - www.warrencustomjewelry.com), incorporated e-commerce sites (such as the barbecue sauce and homemade rub maker in Durant - <http://store.mrpigscafe.com>), or made successful changes to their own site (such as the buffalo meat salesman in Idabel who learned that more people searched for 'bison' than 'buffalo' - www.indianterritorymeats.com). Further, anecdotal evidence suggests that the improved advertising offered by a website can increase small business sales anywhere from 20% to over 200%. With average sales of \$150,000 (which was the average displayed in a small business report by Mississippi State in 2007) this implies that the e-commerce program potentially has increased the revenue of small businesses in Oklahoma by between \$4.3M and \$21.6M.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #5

1. Outcome Measures

Number of communities that build plans for growth and/or improvement

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10	37

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Communities need high quality information to make appropriate decisions, enhance development opportunities, garner funding, enable business and industry in order to improve economic activity, sustainability and development. Most smaller and rural communities do not have the expertise to generate and analyze this information.

What has been done

Our database combines the estimates of retail sales by city and county with population, income, and the number of establishments by industry. Based upon these numbers, we are able to compute various measures of retail activity, such as trade area capture, pull factors, sales gap coefficients and thresholds. These measures provide local officials with an idea of the number and types of retail establishments the local economy can sustain, and it estimates the amount of consumption that is lost to other communities (e.g., leakages from the local economy). The computed measures are then presented to community leaders as a written report and in PowerPoint format. Over the past year there were 25 gap reports, threshold analyses and economic impacts prepared. In addition to the retail trade analysis, this program performs economic impact analysis. Economic impact analysis is a method of demonstrating how businesses within a community are connected, and it computes estimates of the changes in the local economy due to changes in the demand for one or more locally-produced products.

Results

Retail Trade Analysis - Our database combines the estimates of retail sales by city and county with population, income, and the number of establishments by industry. Based upon these numbers, we are able to compute various measures of retail activity, such as trade area capture, pull factors, sales gap coefficients and thresholds. These measures provide local officials with an idea of the number and types of retail establishments the local economy can sustain, and it estimates the amount of consumption that is lost to other communities (e.g., leakages from the local economy). The computed measures are then presented to community leaders as a written report and in PowerPoint format. Over the past year there were 25 gap reports, threshold analyses and economic impacts prepared.

Economic Impact Analysis - Communities use these analyses to identify businesses for recruitment to the community, to support grant requests, and to educate the community on the value of certain industries and/or infrastructure to the economy. For example:

- * The city of Ada requested an economic impact analysis of their Agri-plex facility to inform local citizens of the value of the Agri-plex to the city's economy during the debate over jurisdictional priority regarding the hotel tax.
- * The Northwest Technology Center Small Business Incubator requested an economic impact analysis of the jobs housed therein to support a grant application requesting funds to improve road access to the incubator to allow for tractor trailer traffic.
- * The Northwest Alliance is using an economic impact analysis to support its efforts to build an industrial park in Avard.
- * The city of Mustang passed a resolution to provide infrastructure for a new National Guard Armory due to an economic impact statement provided by us regarding the impact of employment created if the Armory were built. As a result of this commitment, Mustang was awarded the Armory.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
805	Community Institutions, Health, and Social Services

Outcome #6

1. Outcome Measures

Number of leadership class graduates actively participating in community or industry

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	260

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
805	Community Institutions, Health, and Social Services

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought,weather extremes,etc.)
- Economy
- Appropriations changes
- Competing Public priorities

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- Case Study

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #11

V(A). Planned Program (Summary)

1. Name of the Planned Program

Integrated Pest Management

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
133	Pollution Prevention and Mitigation	10%		10%	
202	Plant Genetic Resources	5%		5%	
205	Plant Management Systems	5%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	15%		20%	
212	Pathogens and Nematodes Affecting Plants	15%		20%	
213	Weeds Affecting Plants	15%		5%	
215	Biological Control of Pests Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	20%		20%	
601	Economics of Agricultural Production and Farm Management	5%		5%	
901	Program and Project Design, and Statistics	5%		0%	
Total		100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	5.3	0.0	2.1	0.0
Actual	5.0	0.0	2.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
130000	0	172083	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
130000	0	172083	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
435000	0	1390978	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Assessment of stakeholder priorities for IPM
- Conduct targeted research on pest status, suppression and IPM approaches
- Develop and deliver IPM programs to stakeholders
- Develop pesticide applicator education and pesticide information
- Assess impact of educational activities on stakeholder IPM

2. Brief description of the target audience

Agricultural Producers, Agricultural Groups, Commercial Growers, Retailers, Agricultural Professionals (private, commercial and non-commercial), and landowners, nurseries, individual stakeholders.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	1000	4000	0	0
2008	3568	99385	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	42	12	54

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Stakeholder assessment

Year	Target	Actual
2008	1	36

Output #2

Output Measure

- IPM schools, conferences and workshops

Year	Target	Actual
2008	12	20

Output #3

Output Measure

- Pesticide applicator education schools and workshops

Year	Target	Actual
2008	15	20

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Peer reviewed research publications and extension publications
2	Increased use of pest management approaches for targeted cropping system acres
3	Number of trained certified pesticide applicators
4	Increase in percent of growers with knowledge of and adoption of Glance n Go aphid sampling procedure in wheat

Outcome #1**1. Outcome Measures**

Peer reviewed research publications and extension publications

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	3	54

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)****What has been done****Results****4. Associated Knowledge Areas**

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
133	Pollution Prevention and Mitigation
601	Economics of Agricultural Production and Farm Management
216	Integrated Pest Management Systems
205	Plant Management Systems
215	Biological Control of Pests Affecting Plants
212	Pathogens and Nematodes Affecting Plants

Outcome #2**1. Outcome Measures**

Increased use of pest management approaches for targeted cropping system acres

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	3900	141200

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Canola is a potentially valuable crop for Oklahoma wheat growers because it can help them manage difficult grassy weeds such as Italian ryegrass, and cheat and it provides an additional cash crop. Several insect pests (aphids and caterpillars) attack winter canola throughout the winter and spring months causing economic damage. In a survey conducted in 2006, canola producers listed insects as the second most important production problem that they faced, and aphids (cabbage, turnip and green peach aphids) were the most important insect pest problem. Producers are unfamiliar with their management, and made multiple insecticide applications for their control, with limited success.

What has been done

Entomologists conducted research demonstrations in 2007 and showed that that aphid sprays could be reduced from four applications per season to one per season by planting seed treated with imidacloprid insecticide and using treatment thresholds of 200 aphids per plant.

Results

Results of the research demonstrations showed that producers could save an average of \$30 per acre in spray costs with no loss in yield, resulting in \$150,000 in potential cost savings from reduced pesticide applications to the 2008 crop.

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
212	Pathogens and Nematodes Affecting Plants
205	Plant Management Systems
133	Pollution Prevention and Mitigation

Outcome #3

1. Outcome Measures

Number of trained certified pesticide applicators

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	110	405

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
212	Pathogens and Nematodes Affecting Plants
133	Pollution Prevention and Mitigation

211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
901	Program and Project Design, and Statistics
205	Plant Management Systems

Outcome #4**1. Outcome Measures**

Increase in percent of growers with knowledge of and adoption of Glance n
Go aphid sampling procedure in wheat

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
211	Insects, Mites, and Other Arthropods Affecting Plants

V(H). Planned Program (External Factors)**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)**1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #12

V(A). Planned Program (Summary)

1. Name of the Planned Program

Agricultural Biosecurity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		5%	
212	Pathogens and Nematodes Affecting Plants	25%		60%	
213	Weeds Affecting Plants	5%		5%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%		20%	
903	Communication, Education, and Information Delivery	40%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	2.0	0.0
Actual	2.0	0.0	1.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
79500	0	86041	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
79500	0	86041	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
100000	0	695489	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

*Establish the **Oklahoma Center for Agricultural Microbial Forensics and Biosecurity**, a multi-disciplinary unit to support and address issues of crop and food biosecurity, and their impacts

*Host a **Workshop on Plant Pathogen Forensics** to shape the emerging new discipline of plant pathogen forensics and to define a role for OSU and Oklahoma in that discipline.

*Conduct **scientific research** targeted specifically towards plant pathogen forensics, sociological impacts of terrorism, and other areas of agricultural biosecurity

***Develop an academic "track"** for students seeking M.S. or Ph.D. degrees in established programs such as Plant Pathology, Biochemistry, Plant Sciences or Forensic Sciences, who seek plant pathogen forensics

Offer a short course on microbial forensics to prepare State educators, diagnosticians, researchers, extension agents, students and postdocs, producers and first detectors/responders

Develop an **undergraduate course in Agricultural Biosecurity**

2. Brief description of the target audience

- Key members of National and Oklahoma homeland security community (DHS, FBI, CIA, etc)
- Key members of National and Oklahoma agricultural leaders and representatives
- Oklahoma extension personnel
- Master gardeners
- Oklahoma producers and crop consultants
- OSU students and faculty
- Professional/scientific societies
- Key industries
- The public

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	100	200	0	0
2008	472	17000	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	0	5	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU faculty and staff affiliated with the new Oklahoma Center for Agricultural Microbial Forensics Biosecurity

Year	Target	Actual
2008	7	8

Output #2

Output Measure

- Workshops to develop the discipline of plant pathogen forensics, train "first responders", and state and national stakeholders

Year	Target	Actual
2008	1	1

Output #3

Output Measure

- Number of grant/contract proposals submitted in agricultural microbial forensics and biosecurity

Year	Target	Actual
2008	1	11

Output #4

Output Measure

- Number of journal articles submitted with emphasis on agricultural microbial forensics and biosecurity

Year	Target	Actual
2008	2	6

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Establishment of the Oklahoma Center for Agricultural Microbial Forensics and Biosecurity
2	Number of invitations to agricultural biosecurity team members for participation in initiatives, programs, presentations, and consultations related to agricultural biosecurity and microbial forensics
3	Number of forensics-relevant journal articles published
4	Percentage of agricultural producers, handlers and processors employing at least one new (to them) practice to enhance biosecurity

Outcome #1**1. Outcome Measures**

Establishment of the Oklahoma Center for Agricultural Microbial Forensics and Biosecurity

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

State and federal government agencies that are responsible for public safety need to be able to easily find and access qualified science expertise to deal with biosafety issues including plant pathogens.

What has been done

Over the past 5 years scientists at Oklahoma State University have been organising efforts to develop an institute focused on forensic sciences for plant pathogens.

Results

A director is now hired and developing the staff necessary to successfully implement research and education programs. Two other scientists have been hired, another position is currently advertised and networks of science associates have been established.

4. Associated Knowledge Areas

KA Code	Knowledge Area
903	Communication, Education, and Information Delivery
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
212	Pathogens and Nematodes Affecting Plants

Outcome #2**1. Outcome Measures**

Number of invitations to agricultural biosecurity team members for participation in initiatives, programs, presentations, and consultations related to agricultural biosecurity and microbial forensics

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15	37

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
903	Communication, Education, and Information Delivery
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

Number of forensics-relevant journal articles published

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	2	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery
212	Pathogens and Nematodes Affecting Plants

Outcome #4

1. Outcome Measures

Percentage of agricultural producers, handlers and processors employing at least one new (to them)practice to enhance biosecurity
Not reporting on this Outcome for this Annual Report

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought,weather extremes,etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Other (exotic pathogens, terrorism)

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Time series (multiple points before and after program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #13**V(A). Planned Program (Summary)****1. Name of the Planned Program**

Structure and Function of Macromolecules

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		15%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		15%	
206	Basic Plant Biology	0%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	0%		5%	
304	Animal Genome	0%		10%	
305	Animal Physiological Processes	0%		25%	
311	Animal Diseases	0%		5%	
312	External Parasites and Pests of Animals	0%		5%	
501	New and Improved Food Processing Technologies	0%		5%	
	Total	0%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	6.9	0.0
Actual	0.0	0.0	3.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	258125	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	258125	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	2086467	0

V(D). Planned Program (Activity)**1. Brief description of the Activity**

Basic research will be conducted that will make fundamental discoveries which will enhance our understanding of molecular mechanisms involved in the regulation of physiological processes in plant and animal systems.

- New faculty and staff will be recruited to build, foster and maintain a cohesive critical mass of research faculty with a diverse set of expertise that focus on the study of structural biology.
- Grant proposals will be written to acquire and maintain state of the art equipment to enhance the research capabilities relating to protein structure/ function/ interactions on the OSU campus.
- Funds will be applied for/ solicited from national, state and university sources to acquire, maintain and restore support for "Core" facilities that are critical to the research mission of DASNR and Oklahoma State University.
- Proposals will be submitted to attract sufficient extramural support to establish an extramurally funded "Structural Biology" Center at OSU that will stimulate collaborations and research productivity.

- Design and conduct basic research to fill critical gaps in scientific knowledge that will address needs, issues and problems that ultimately can be translated into an improvement in plant and animal health.
- Develop new research methods and procedures
- Train undergraduate and graduate students, and postdoctoral associates
- Publish scientific articles
- Write and submit grant proposals
- Attend and present scientific findings at professional meetings
- File patents for protection of intellectual property and negotiate licensing agreements for technology transfer
- Interact with other researchers both on and off the OSU campus.

2. Brief description of the target audience

Team members

- Departments and department heads
- OSU administrators
- Other faculty and other scientific researchers in DASNR, at OSU & the scientific community
- Students and post-docs
- Federal, state, and private funding agencies
- Scientific journal editors, readers & the scientific community
- Candidates for open faculty and staff positions.
- Patent officers
- Agricultural, environmental, life, and human science industries
- General public and elected officials

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	2

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	0	43	43

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of manuscripts submitted based on reserach efforts

Year	Target	Actual
2008	26	43

Output #2

Output Measure

- Number of extramural grants submitted with preliminary data from research efforts

Year	Target	Actual
2008	18	19

Output #3

Output Measure

- Number of presentations given at meetings and conferences to disseminate research results

Year	Target	Actual
2008	14	19

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Number of graduate students graduated and postdoctorial associates mentored in structural biology
2	Number of manuscripts published
3	Number of invitations faculty receive to present research findings at universities and colleges and national and international meetings
4	Number of new plant varieties developed from research
5	Number of new drugs that move into clinical or veterinary application
6	number of new pesticides developed that replace hazardous or less environmentally safe alternatives currently in use.

Outcome #1**1. Outcome Measures**

Number of graduate students graduated and postdoctoral associates mentored in structural biology

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6	10

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

New ultra-accurate mass spectrometers are revolutionizing the fields of proteomics and structural biology by providing crucial insights into the identity, structure, function, and regulation of fundamentally important biomolecules. Therefore, there is a high demand for researchers trained in the use of state-of-the-art mass spectrometry. While graduate students often get training in theoretical aspects of mass spectrometry, they rarely get hands on experience running state-of-the-art equipment.

What has been done

TEAM Investigators collaborated in a proposal to the National Science Foundation, resulting in a \$0.5 Million award. With matching funding, the University acquired one of the world's most powerful and most accurate mass spectrometers, an LTQ-Orbitrap. The instrument was installed in 2008, and is used daily by a variety of researchers who are further supported by two DASNR mass spectrometry specialists. OSU's new ultra-accurate mass spectrometer is being used to provide crucial insights into the structure, function, and regulation of several fundamentally important biomolecules, such as: 1) Midline-1, a protein involved in regulating vertebrate development, whose dysregulation results in birth defects; 2) lipid droplet associated protein-1 and apolipoproteinA-I, proteins involved in regulating the metabolism and transport of lipids in insects, with potential applications for agriculture in terms of insect control, and increased understanding of human lipid metabolism; and 3) pectin, a significant component of plant cell walls, and plant biomass. Other scientists are employing the instrument to identify proteins that regulate plant-insect and plant-microbe relationships, responses to environmental stress, lung development and differentiation, animal immune responses, plant meiosis, to optimize nano-separation of biomolecules, and to study the antibiotic activities of novel peptides.

Results

Researchers at Oklahoma State University are using a powerful new mass spectrometer to identify and dissect macromolecules that regulate the health and disease of crops, livestock, and humans, giving new insight into fundamental biological processes. The instrument is also supporting the development of applied methods for increasing agricultural productivity, and providing DASNR graduate students with marketable hands-on training in an important bio-analytical technique that is in high demand in both the academic and industrial communities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
212	Pathogens and Nematodes Affecting Plants
201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
311	Animal Diseases
312	External Parasites and Pests of Animals
211	Insects, Mites, and Other Arthropods Affecting Plants
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
304	Animal Genome
501	New and Improved Food Processing Technologies

Outcome #2

1. Outcome Measures

Number of manuscripts published

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	18	31

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Human interleukin-18 (hIL-18) is a cytokine that plays an important role in inflammation and host defense against microbes. Its activity is regulated in vivo by a naturally occurring antagonist, the human IL-18-binding protein (IL-18BP). Functional homologs of human IL-18BP are encoded by all orthopoxviruses, including variola virus, the causative agent of smallpox. They contribute to virulence of small pox by suppressing IL-18-mediated immune responses.

What has been done

Dr. Junpeng Deng's group has published the crystal structure of an orthopoxvirus IL-18BP, ectromelia virus IL-18BP (ectvIL-18BP), in complex with hIL-18. The hIL-18 structure in the complex shows significant conformational change at the binding interface compared with the structure of ligand-free hIL-18, indicating that the binding is mediated by an induced-fit mechanism. EctvIL-18BP works by blocking a receptor-binding site on IL-18, thus preventing IL-18 from engaging its receptor

Results

The first structure of any IL-18 binding protein has been published, which has revealed the antagonistic mechanism by which poxviruses evade human immune response. The results yield significant insight into approaches for designing new therapeutics for treatment of both infectious diseases by poxviruses, certain inflammatory diseases and autoimmune diseases.

4. Associated Knowledge Areas

KA Code	Knowledge Area
304	Animal Genome
305	Animal Physiological Processes
312	External Parasites and Pests of Animals
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
311	Animal Diseases
206	Basic Plant Biology
501	New and Improved Food Processing Technologies
212	Pathogens and Nematodes Affecting Plants
211	Insects, Mites, and Other Arthropods Affecting Plants
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #3**1. Outcome Measures**

Number of invitations faculty receive to present research findings at universities and colleges and national and international meetings

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	4	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
312	External Parasites and Pests of Animals
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
304	Animal Genome
212	Pathogens and Nematodes Affecting Plants
501	New and Improved Food Processing Technologies
311	Animal Diseases
201	Plant Genome, Genetics, and Genetic Mechanisms
211	Insects, Mites, and Other Arthropods Affecting Plants
305	Animal Physiological Processes

Outcome #4**1. Outcome Measures**

Number of new plant varieties developed from research

*Not reporting on this Outcome for this Annual Report***Outcome #5****1. Outcome Measures**

Number of new drugs that move into clinical or veterinary application

*Not reporting on this Outcome for this Annual Report***Outcome #6****1. Outcome Measures**

number of new pesticides developed that replace hazardous or less environmentally safe alternatives currently in use.

*Not reporting on this Outcome for this Annual Report***V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Economy
- Appropriations changes
- Competing Public priorities

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Time series (multiple points before and after program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #14**V(A). Planned Program (Summary)****1. Name of the Planned Program**

Farm and Agribusiness Management

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	50%		100%	
602	Business Management, Finance, and Taxation	50%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	8.8	0.0	3.5	0.0
Actual	10.0	0.0	3.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
201000	0	86042	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
201000	0	86042	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1155000	0	695489	0

V(D). Planned Program (Activity)**1. Brief description of the Activity**

Research based information developed

Decision aids developed that assist farm and agribusiness managers in improved decisions

Educational programs conducted that improve the management skills of farm and agribusiness managers

Farm and agribusiness managers are able to better understand economic consequences and make more informed decisions

2. Brief description of the target audience

Managers, owners, and employees of farms and agribusinesses

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	500	1000	100	200
2008	5633	218500	150	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	10	5	15

V(F). State Defined Outputs

Output Target

Output #1**Output Measure**

- Number of board members of farmer-owned cooperatives receiving credentialed director training for board governance

Year	Target	Actual
2008	50	35

Output #2**Output Measure**

- Number of software decision analysis aids developed

Year	Target	Actual
2008	2	3

Output #3**Output Measure**

- Number of manuscripts submitted to refereed journals

Year	Target	Actual
2008	3	15

Output #4**Output Measure**

- Number of farm income tax management schools conducted

Year	Target	Actual
2008	10	14

Output #5**Output Measure**

- Number of economists trained at other universities to deliver packer-feeder workshops and classes

Year	Target	Actual
2008	5	4

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Number of tax preparers using information from OCES tax schools
2	Number of credentialed board members serving on agricultural cooperative boards (cumulative)
3	Number of beef producers applying some level of financial management decision skills learned through Master Cattleman certification
4	Number of specialty crop producers and goat producers improving farm management and/or financial management skills

Outcome #1**1. Outcome Measures**

Number of tax preparers using information from OCES tax schools

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	2106

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Frequent changes in Federal and Oklahoma State Tax Laws create a need to keep tax preparers informed of the impact of the changes and how to best help their clients utilize the tax planning and management opportunities available in the current tax laws. These tax schools are designed to update tax preparers about new laws and regulations covering farm, non-farm business and individual taxpayer issues.

What has been done

This program has been conducted for the past 46 years. It has grown from a one-day seminar to its present form of two days per location for the fall Farm and Business Tax Institutes and the summer Tax Clinic. The combination of all the schools allows a preparer to get the full 40 hours of CPE/CLE as required by state. Topics covered range from presentation of new tax laws and their implications, agricultural issues, business issues, tax planning opportunities, professional ethics, retirement, and social security to name a few. Twelve two day sessions are conducted each year with two of these in the summer and ten in the fall and two one day special topics courses. Total 2008 attendance for the schools was approximately 2,106 tax preparers in 14 workshops. Certified public accountants make up 46 percent of the attendance, 27 percent are tax preparers and bookkeepers, 10 percent are enrolled agents, 2 percent are attorneys, and the remaining 15 percent come from a variety of backgrounds. These tax preparers file roughly 80 percent of the farm returns for taxpayers in the state of Oklahoma.

Results

High quality, professional instruction is provided to make continuing education credit available for Certified Public Accountants, Enrolled Agents, and Tax Attorneys. Many of those attending have stated that they have been coming to these programs since they began. Participants filed more than 51,000 Federal farm tax returns and 324,000 Federal non-farm tax returns as reported by the participants in the most recent program evaluations. Most of the tax preparers that attend are from Oklahoma however there have been preparers from Kansas, Texas, New Mexico, Arkansas, Florida, and California attending the program in order to maintain their Oklahoma accreditation. Just two pieces of information supplied this year for farm returns and mineral owners is estimated to save at least \$10 per return on average - resulting a likely taxpayer savings of over \$3,000,000.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

Outcome #2**1. Outcome Measures**

Number of credentialed board members serving on agricultural cooperative boards (cumulative)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	80	50

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

The board of directors of an agricultural cooperative has responsibility for strategic decisions and for safeguarding the organizations assets. Agricultural cooperative board members are producers who are elected by the membership to serve with only token remuneration. In recent times, all board members, including cooperative board members are under intense scrutiny. The incidence of legal proceedings against board members has increased dramatically. These litigations are typically initiated by owner (member) groups and they focus on the competency and diligence of the board. The severe repercussions from errant business decisions and the intense scrutiny of board member competency have created a critical need for educational programs.

What has been done

In response to the critical need to improve the competencies of cooperative board members the Oklahoma Credential Cooperative Director (OCCD) program was created. The OCCD program involves two days of training on finance, legal responsibilities, parliamentary procedure, effective meeting management, strategic planning and other related topics. In designing the OCCD curriculum, board of director training material from across the U.S. was examined. OCCD instructors include OCES faculty as well as industry experts including bankers, auditors, attorneys and consultants. The OCCD program is delivered simultaneously at a central location and via two-way interactive video at eight remote locations across Oklahoma.

The OCCD program was initiated in November of 2001. Since then it has been offered eleven times (spring and fall) with nine advanced sessions. Over 3500 directors have attended the Credentialing sessions and over 400 directors have returned for advanced training.

Results

The directors completing the OCCD program have a better understanding of financial management and the legal roles and responsibilities of the board of directors and are able to make better business decisions and to safeguard the assets of their cooperative organizations. Currently there are over 150 Credentialed directors representing 44 cooperatives and over 150 more directors who are progressing through the credentialing training. Over 400 directors from 37 separate cooperatives have attended an advanced session. Twenty cooperatives have achieved the status of having every board member credentialed. The typical Oklahoma cooperative includes 1,500 or more farmer members and organizational assets of over \$10M. The OCCD program impacts thousands of Oklahoma producers by enhancing the board's ability to manage and safeguard cooperative assets.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

Outcome #3**1. Outcome Measures**

Number of beef producers applying some level of financial management decision skills learned through Master Cattleman certification

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	90

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Production management, business planning, risk management and marketing are major issues for the beef producers who comprise Oklahoma's #1 agricultural industry.

What has been done

A comprehensive educational program in cooperation with Agricultural Economics, Animal Science, Plant and Soil Science, Vet Med, Biosystems and Ag Engineering . The OSU Master Cattleman Program was launched in 2004 with the objective of enhancing the profitability of beef operations and the quality of life of beef producers by equipping them with vital information on many aspects of beef production, business planning, risk management and marketing. The educational curriculum is based on the Oklahoma Beef Cattle Manual. PPTs and lesson plans are available to educators via the Master Cattleman website. Producers must complete four hours in each of six subject matter areas plus an additional four hours of instruction or special projects. Local Extension educators plan and organize the Master Cattleman educational series and select the specific curriculum offered.

Results

90 producers were certified under the OSU Master Cattleman Program in 2008

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
601	Economics of Agricultural Production and Farm Management

Outcome #4**1. Outcome Measures**

Number of specialty crop producers and goat producers improving farm management and/or financial management skills

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	75	1205

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

The meat goat industry has been rapidly expanding in Oklahoma and the United States. Meat goat numbers in Oklahoma have gone from not even being counted by USDA to 94,000 in 2007, ranking 5th in the U.S goat numbers. This rapid expansion in goat numbers has created a need for meat goat production education. In addition to the differences between goat production and other livestock production systems, many goat producers are relatively new to livestock production. These producers not only need education on goat production practices but also education on how to do the simple management techniques such as ear tagging, castrating, and body scoring that many livestock producers take for granted. The Oklahoma Meat Goat Boot Camp was created to meet the educational needs of these goat producers.

What has been done

The Oklahoma Meat Goat Boot Camp was created to provide a multi-day workshop where producers could learn management and production practices that would help them own/operate a successful meat goat operation. Knowledge areas covered included ear tagging, castrating, tattooing, hoof trimming, aging, fence building, forage planning and evaluation, business planning and management, nutrition and ration balancing, parasite control, FAMACHA, fecal egg counts, neo-natal and birthing, general herd health management and reproduction management.

Results

Five workshops on goat production and marketing were held during 2008. Presentations on goat production were made at various industry conferences with a total audience of over 1,200. The demand for this educational experience has been outstanding. Class size was limited to 50 participants so that producers would be in smaller groups. The first camp filled up before local advertising could begin. This demand caused the organizers to conduct a second boot camp four months later. As the organizers, we underestimated the interest from goat producers from outside of Oklahoma. To date two camps have been completed with 111 participants from fifteen states. Participants have come from as far away as Michigan, New Jersey, New York, North Carolina, Tennessee, Kentucky and Georgia.

All participants were asked to evaluate the program and determine the impact to their operation. The following are the results from the evaluations.

- * 80% of the sessions taught were of great value to participants
- * 45% potential adoption rate of information and management practices from the boot camp
- * Average perceived dollar value of the information presented was \$20.89/goat
- * Total value perceived for both camps \$93,600

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

V(H). Planned Program (External Factors)**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)**1. Evaluation Studies Planned**

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #15

V(A). Planned Program (Summary)

1. Name of the Planned Program

Sensor-Based Technologies for Agricultural and Biological Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	25%		10%	
205	Plant Management Systems	35%		25%	
307	Animal Management Systems	15%		15%	
402	Engineering Systems and Equipment	25%		50%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	5.3	0.0	3.5	0.0
Actual	3.0	0.0	1.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
65000	0	86042	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
65000	0	86042	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
198061	0	695489	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research into nutritional and pest management needs of wheat, corn, cotton, native, improved pasture, and turf grass in relation to sensed properties. Conduct research into animal grazing system to optimally manage plant and animal subsystems. Conduct research to invent and improve sensors and control systems for agriculture production and processing systems. Conduct research to create decision support systems incorporating sensors into plant and production systems.

2. Brief description of the target audience

Crop and livestock producers, food processors, input suppliers, equipment manufacturers.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	300	1000	0	0
2008	2247	16150	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	1
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	0	11	11

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Training sessions and demonstrations for use of new technologies and applications

Year	Target	Actual
2008	6	16

Output #2

Output Measure

- New technology applications

Year	Target	Actual
2008	2	0

Output #3

Output Measure

- Number of trained extension personnel using hand-held sensors with producers

Year	Target	Actual
2008	30	0

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O No.	OUTCOME NAME
1	Commercialization of hardware/instrumentaion
2	Number of producers adopting and practicing sensor-based technologies
3	Number of acres where sensor-based technologies are applied

Outcome #1**1. Outcome Measures**

Commercialization of hardware/instrumentation

*Not reporting on this Outcome for this Annual Report***Outcome #2****1. Outcome Measures**

Number of producers adopting and practicing sensor-based technologies

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	200	500

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

On a worldwide scale, nitrogen use efficiency for cereal grain production is approximately 33%. This means that 67% of the applied nitrogen is not utilized by the plant. The use of sensors for crop management decisions is becoming more popular and more crop producers and consultants are exploring this technology.

What has been done

In 2008, there were five OSU Plant and Soil Science Extension Newsletter articles regarding sensor-based nutrient management as well as a new Extension factsheet released. There was also a new OSU field day reference sheet and new five mini-handouts developed on sensor-based crop nutrient management. On January 17, 2008, there was a Sensors for Crop Management Conference held at the Payne County Fairgrounds and Expo Center in Stillwater, OK.

Results

There were numerous Extension training sessions, field days and at least sixteen professional meetings presentations about sensors for crop management. The technology developed at OSU for sensor-based nutrient management has been adopted around the world and this has resulted in over 80 OSU graduate students working with CIMMYT in Mexico, Turkey, China, Argentina, India, Russia, and Uzbekistan. In 2008, OSU held Sensor Training Workshops in Ethiopia (June, 2008), and in Zimbabwe (January 8, 2008).

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
102	Soil, Plant, Water, Nutrient Relationships

Outcome #3**1. Outcome Measures**

Number of acres where sensor-based technologies are applied

*Not reporting on this Outcome for this Annual Report***V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Other (commercialization opportunities)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Time series (multiple points before and after program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #16**V(A). Planned Program (Summary)****1. Name of the Planned Program**

Bio-Based Products Development

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
511	New and Improved Non-Food Products and Processes	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	4.0	0.0
Actual	1.0	0.0	2.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
23127	0	172083	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
23127	0	172083	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
100000	0	1390978	0

V(D). Planned Program (Activity)**1. Brief description of the Activity**

- Project proposals
- Technical presentations
- Technical papers
- Journal articles
- Patents
- Products taken to commercialization by industry

2. Brief description of the target audience

Other scientists, industry, agricultural producers, commercial developers

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	924	245000	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year Target

Plan: 2

2008 : 1

Patents listed

An application was submitted for a new switchgrass variety released in 2008. Team member is Yanqi Wu, working with Charles Taliaferro.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	11	16	27

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Journal Articles

Year	Target	Actual
2008	5	16

Output #2

Output Measure

- Technical papers and presentations

Year	Target	Actual
2008	12	39

Output #3

Output Measure

- New processes developed

Year	Target	Actual
2008	1	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Products/processes taken to commercialization by industry

Outcome #1

1. Outcome Measures

Products/processes taken to commercialization by industry

Not reporting on this Outcome for this Annual Report

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}